THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXV. No. 1669.] LONDON, MAY 7, 1895. [47TH YEAR. PRICE 6d.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works
(also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

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For Carbon Bisulphide, Sulphuretted Hydrogen, and Carbonic Acid in Coal Gas.
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Lanemark Coal Co.,
LIMITED.
LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on Application to
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NEW CUMNOCK, N.B.
Shipping Ports: All the principal Scotch Ports.

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Parker's Imperial Black Varnish,
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ROBERT MARSHALL,
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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.
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BURNS ANY KIND OF WASTE FUEL TO ADVANTAGE.

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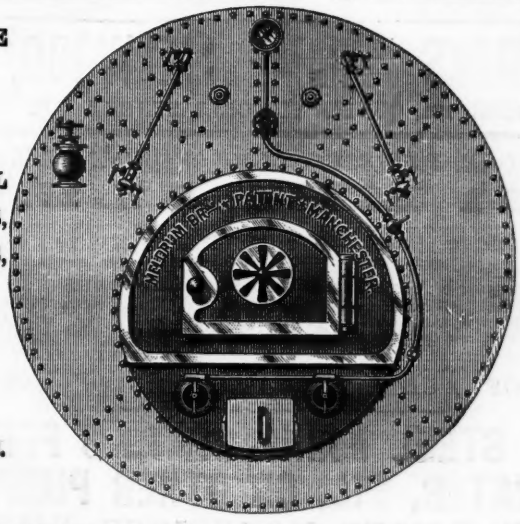

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(ESTABLISHED 1765),

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WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

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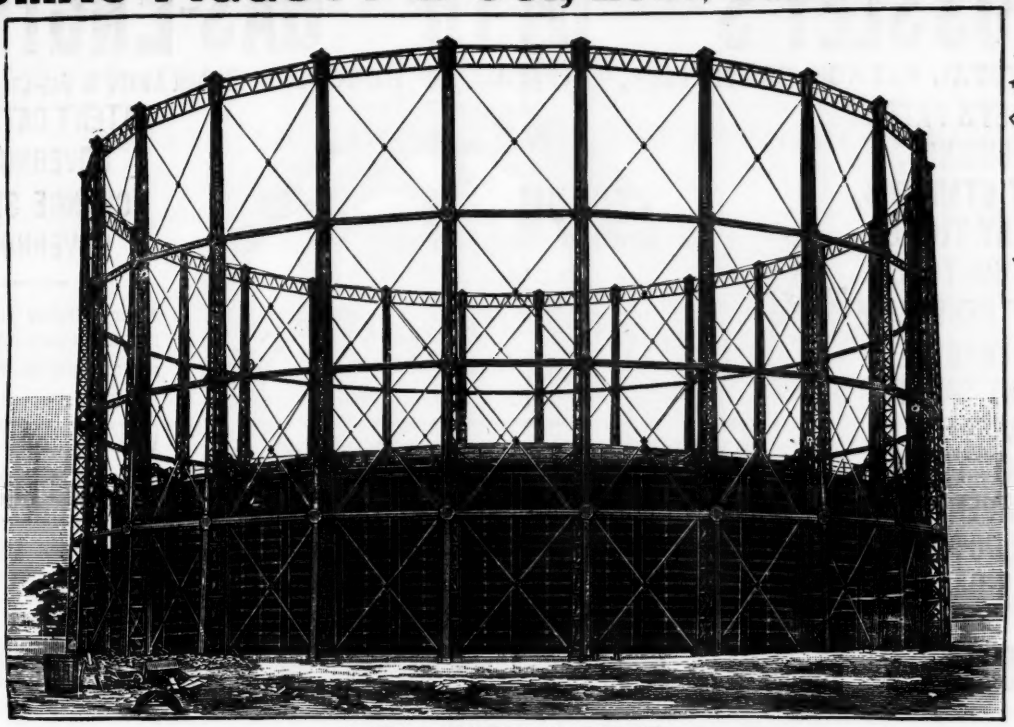

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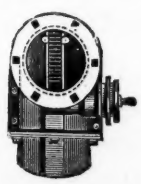

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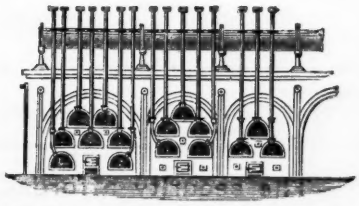
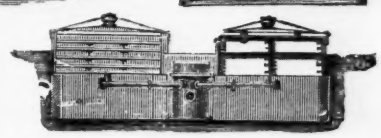


WROUGHT AND CAST IRON
CONDENSERS,
SCRUBBERS, & WASHERS,
TAR AND LIQUOR PUMPS, &c.

PATENT
CENTRE-VALVES
for working Purifiers,
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,



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GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

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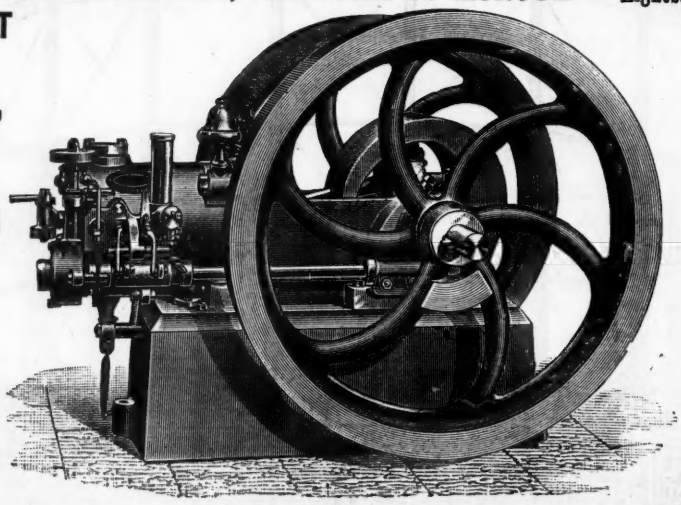

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Every Engine thoroughly tested before being sent out

ALL PARTS MADE STRICTLY TO GAUGE

GREAT REDUCTION IN PRICES.

OVER 800 ENGINES ALWAYS IN HAND.

CROSSLEY'S NEW HIGH-SPEED ENGINE FOR DIRECT ELECTRIC LIGHTING.

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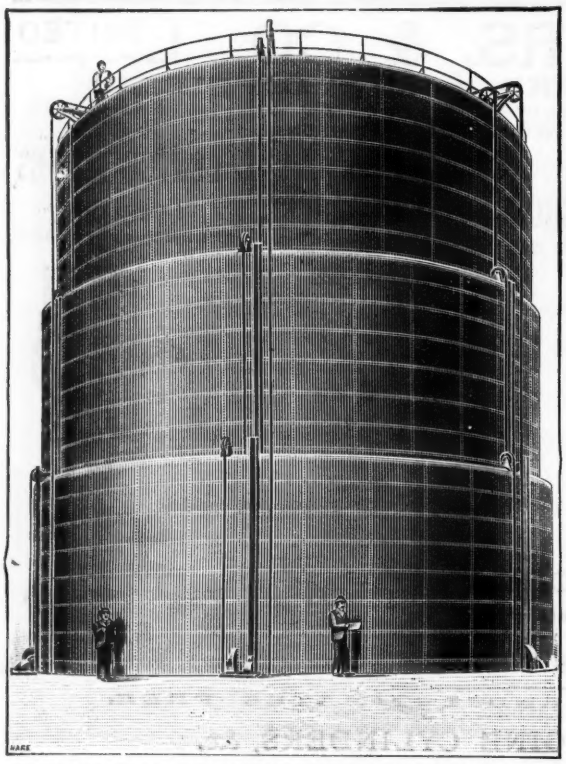

From Photo. of Three-Lift Roped Holder, 50 feet diameter by 18 feet deep each Lift. Erected at Sligo, 1894.

Pease's Patent Roped Gasholders

THESE HOLDERS HAVE WORKED SUCCESSFULLY UNDER EVERY TEST TO WHICH THEY HAVE BEEN SUBJECTED SINCE 1889.

MAY BE SEEN AT MANY PLACES.

Send for Catalogue if requiring increased Storage.

The security afforded by this System is shown by the working of the Three-Lift Holder, the subject of this engraving; not only was the Holder unaffected by the recent heavy gales, but also the recorded strain on the Ropes was remarkably small.

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Telegrams { "GASHOLDER, STOCKTON-ON-TEES." "APPARATUS, LONDON."

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Registered Office—28, ROYAL EXCHANGE SQUARE, GLASGOW.

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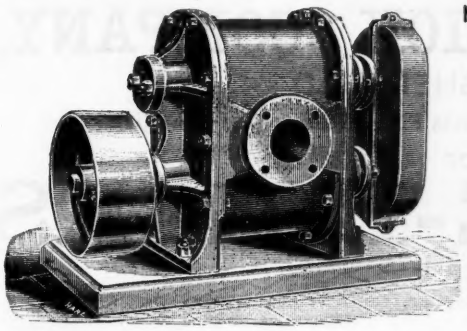
DRUM PUMP AND GAS EXHAUSTER.

The Pump of the future for quickly and economically moving large bodies of Water, Semi-Fluids, &c.

The force of the Piston Pump with the capacity of the Centrifugal combined.

NO SLIDES OR FRICTIONAL WORKING PARTS.



NO PRIMING.

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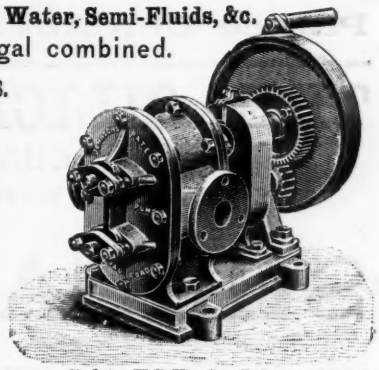

As supplied to H.R.H. the Prince of Wales for Pumping Gas Liquor at his Sandringham Gas-Works.

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Hydraulic and Pneumatic Engineers, 55, ATHOL ROAD, BRADFORD.

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CUTLERS PATENT TUBULAR GAS CONDENSER SUITABLE FOR GASWORKS OF ALL SIZES, AND FOR ANY CLIMATE OVER 100 ERECTED

MAKERS OF GASHOLDERS OF EVERY SIZE AND TYPE

HUNT'S PATENT WASHER. IS THE ONLY APPARATUS NECESSARY BETWEEN THE CONDENSER & PURIFIERS. IT REQUIRES NO MOTIVE POWER

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ALL COMMUNICATIONS RESPECTING THE

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Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.

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Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.

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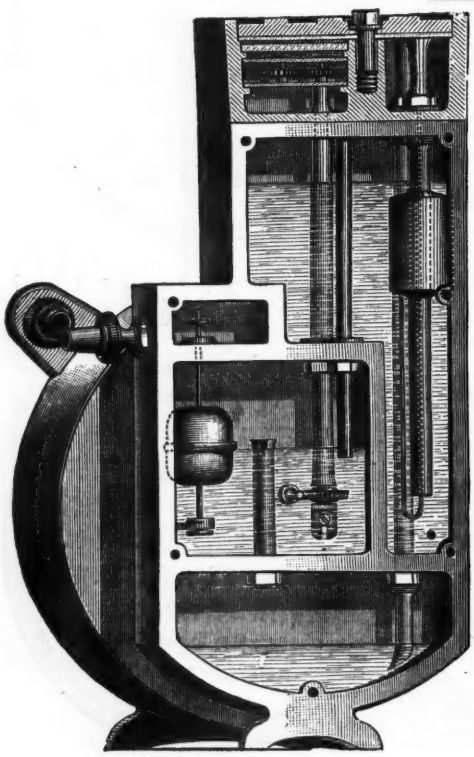
IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.



Sole Makers of Green's Patent Underground Wet Gas-Meters for Street Lighting, &c., and Ogden's Patent Spindle Tube for Wet Gas-Meters.

GREEN'S PATENT

UNDERGROUND METER

Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required, and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s., and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 3½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid, which does not injure the fittings; and this can be supplied at about 1s. 3d. per gallon.

Prices and all Information on Application.

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HIGHEST AWARDS given for our WET and DRY METERS at

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London Office: 10, FINSBURY SQUARE.

PURIFIERS with Planed Joints.

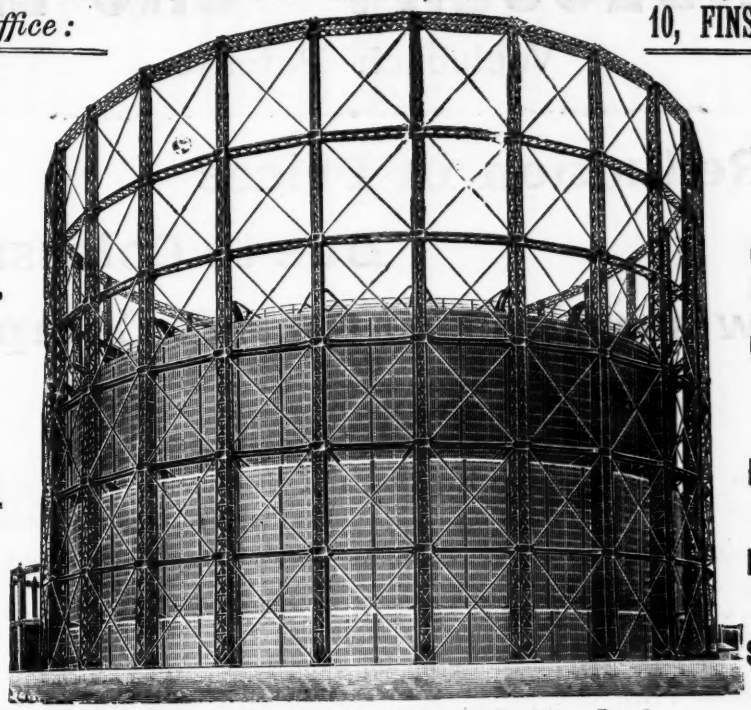
TOWER SCRUBBERS.

WECK'S PATENT CENTRE-VALVE.

CONDENSERS.

TAR PLANT.

SULPHATE OF AMMONIA PLANT.



Eight Million Cubic Feet Gasholder at Beckton, London.

WASHERS.

WASHER-SCRUBBERS.

CLAUS' SULPHUR-RECOVERY PLANT.

CENTRE & FOUR-WAY VALVES.

CRIPPS' HYDRAULIC MAIN VALVE.

RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES.

WALKER'S PATENT PURIFYING-MACHINE.

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MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching

650,000,000

CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **FOUR YEARS.**

More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital, Labour, Fuel, Wear and Tear, &c.

The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

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Dealers in Carburine and all other Naphthas for the Enrichment of Gas.

INCANDESCENT GAS-LAMPS

Welsbach Patents.

Great Reduction in Prices

Due to Colossal Sales.

Now supplied at 10/6 Complete.

Important Notice.

Owing to the **unexpectedly large sales** of the Incandescent Gas-Light Burners, the Company are now in a position to offer these to the public at a **considerably Reduced Price**; thus bringing the unquestionable advantages of this System within the reach of the most moderate incomes.

At the higher price, we claimed with justice that the initial cost of the burner was covered by the saving in gas in twelve months, or less. We can, with equal justice, claim that at the **Reduced Price** this saving is effected in **eight months, or less.**

THREE PATTERNS OF INCANDESCENT GAS-LIGHT BURNERS ARE NOW SUPPLIED.

The Ordinary "C" Burner	**Price 10s. 6d.**
The "C" Bye-Pass Burner	**„ 12s. 6d.**
The "S" Bye-Pass Burner	**„ 12s. 6d.**

Mantles will be supplied as heretofore at the reduced rate of 1s. 3d. for use with the Burner supplied by the Company.

PUBLIC WARNING.

The Mantles manufactured by the Incandescent Gas-Light Company can only (as provided by the terms of the limited licence granted with each Mantle) be lawfully used on Burners of the Company's own manufacture. Any person who sells one of the Company's Mantles with, or for use on, any other Burner, and any one of the public who uses one of the Company's Mantles on any Burner not of the Company's manufacture, will render himself liable to proceedings for **Infringement of the Company's Patents.** All persons are therefore warned against having anything to do with Burners not bearing the name of the Incandescent Gas-Light Company stamped upon them.

The *Lancet* pronounces the Incandescent Gas-Light to be the HEALTHIEST, BEST, AND MOST ECONOMICAL SYSTEM OF GAS LIGHTING.

COPY OF FULL REPORT SENT GRATIS ON APPLICATION.

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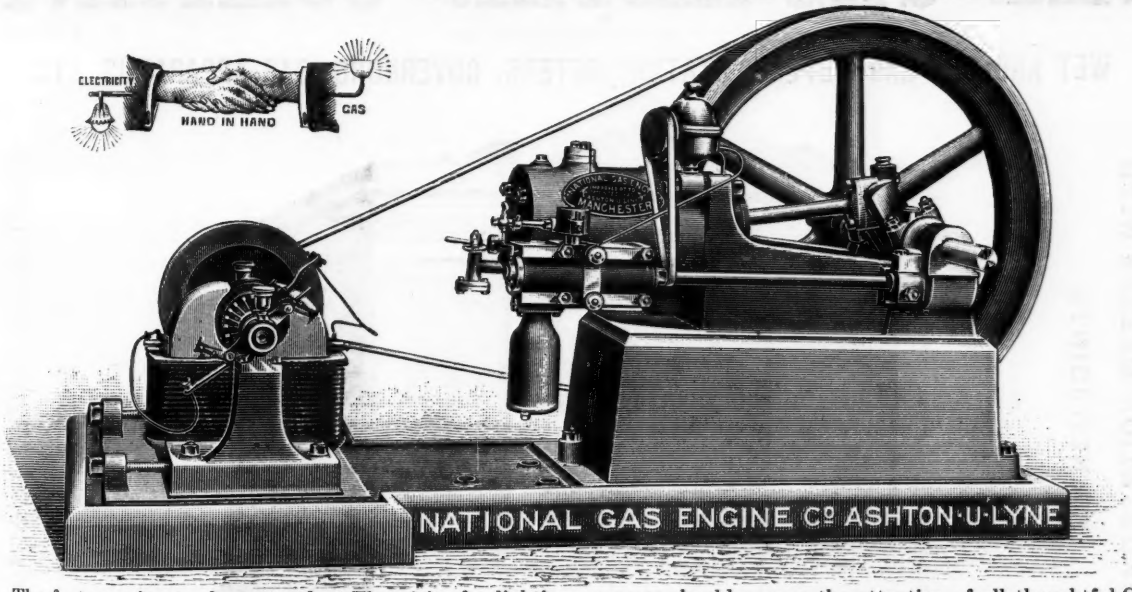
The INCANDESCENT GAS-LIGHT CO.

LIMITED,

PALMER STREET, WESTMINSTER, LONDON, S.W.

IMPORTANT TO GAS-WORKS MANAGERS



The fast growing tendency to adopt Electricity for lighting purposes should engage the attention of all thoughtful Gas-Works Managers and those interested in Gas Companies.

By the aid of the Gas-Engine driving the Dynamo, **50 PER CENT. MORE LIGHT CAN BE OBTAINED FROM THE SAME GAS;** and thus, by their adoption as the motive power, the gas consumption of the district can be maintained and the light increased.

The **NATIONAL GAS-ENGINE** is specially constructed for this purpose, both for Small Installations for isolated places, and also for large Central Electric Light Station Work.

For Prices, Testimonials, and List of Users, apply to

THE NATIONAL GAS-ENGINE CO.,

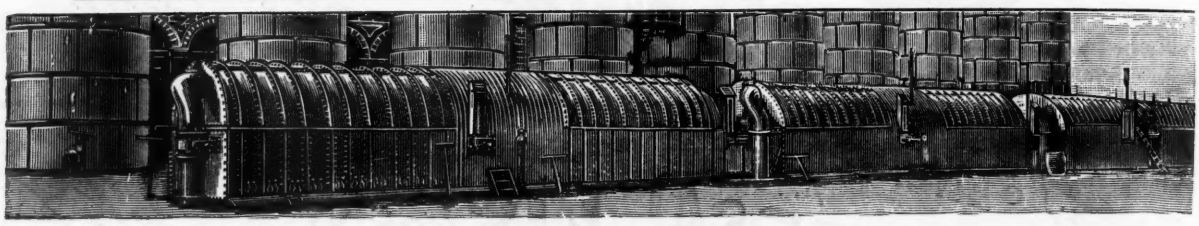
ASHTON-UNDER-LYNE.

DISTRICT AGENTS WANTED.

KIRKHAM, HULETT, & CHANDLER, LD.

PATENT "STANDARD" WASHER-SCRUBBER

☛ **492** of these Machines (capable of dealing with **472,540,000** cubic feet of Gas daily) in use, which fact is given as evidence of this apparatus being the Most Efficient of any in the Market for the extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.



View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have **30** of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

MARSHALL'S PATENT BATTERY CONDENSER & SCRUBBER.

This apparatus being made in sections, the capacity can be easily and cheaply made proportionate to increased make of Gas. Other advantages are: Large and effective cooling area on small ground space, slow speed, no repairs required, high strength liquor obtained, &c.

MARSHALL'S PATENT TAR-EXTRACTOR.

Extracts practically all the Tar without choking up, and gives minimum back-pressure.

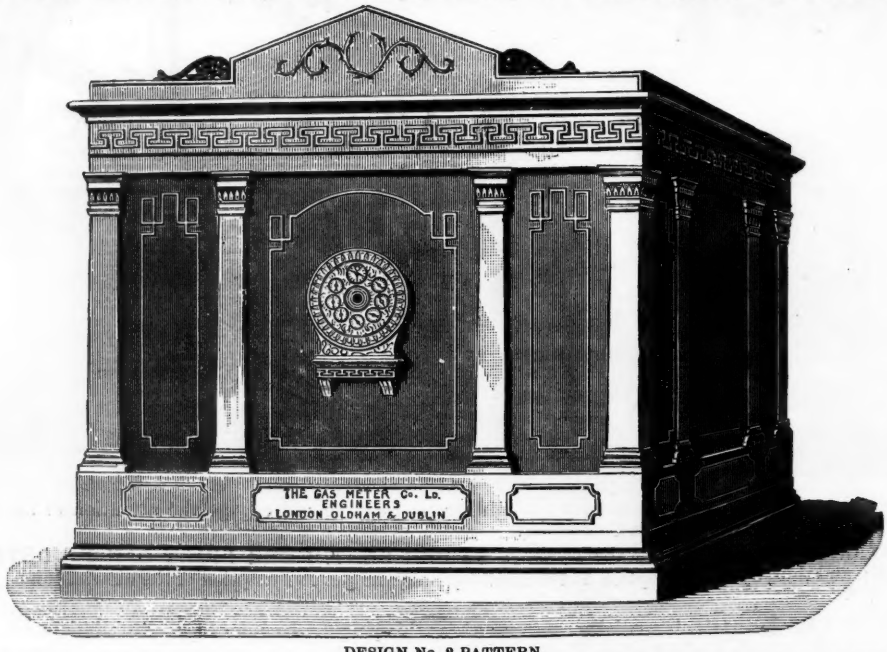
3 & 4, Palace Chambers, Bridge Street, Westminster, S.W.

THE GAS-METER COMPANY, LIMITED,

MANUFACTURERS OF

WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.



STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM, LATE WEST & GREGSON. **Established 1830.**

For Prices and Particulars apply to

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Telegraphic Address: "METER."

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THE FIRST PRACTICAL AUTOMATIC GAS-METER

Was Manufactured under the Patents of

The Automatic Gas-Meter Company, Ltd.,

Whose present Automatic Gas-Meter is absolutely

"UNBREAKABLE, UNFAKEABLE," AND THE BEST IN THE MARKET.

CAN BE ORDERED TO TAKE EITHER PENNIES OR SHILLINGS.

LONDON: 49, Queen Victoria Street, E.C. | **MANCHESTER:** Factories: Upper Brook Street, & Rosamond Street East. | **LEEDS:** 5, Merrion Street.

Engineer: T. GARDINER MARSH.

Telegraphic Address: "Robustness, London." Telephone No. 1756.

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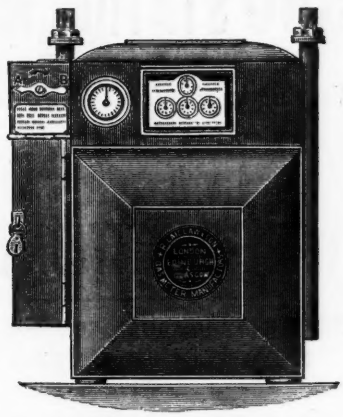

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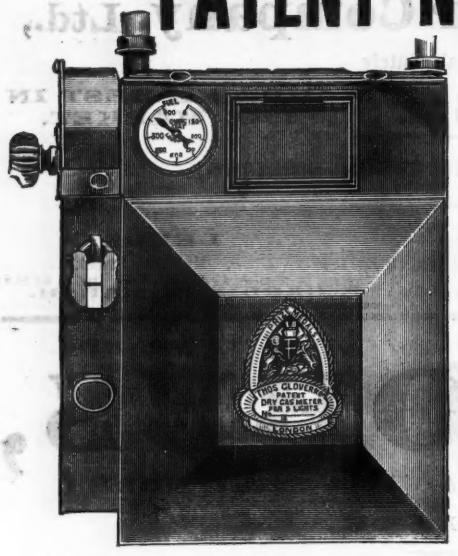

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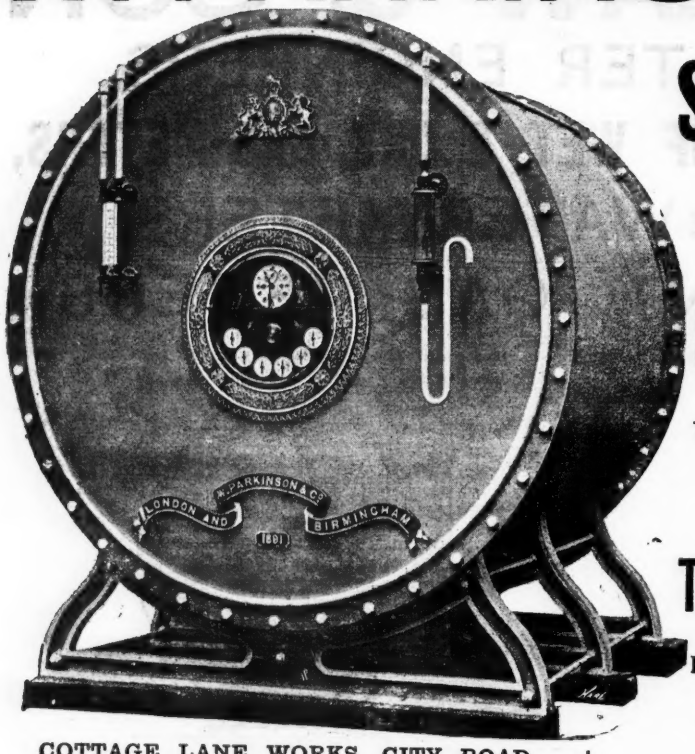

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EDITORIAL NOTES.

Manchester Gas Affairs.

THE Manchester Corporation have good reason to be satisfied with the results of last year's working of their Gas Department, as will be seen from the report of Alderman Gibson's statement at Wednesday's meeting of the City Council, which will be found in another column. Indeed, the Chairman of the Gas Committee went so far as to say "they had had a marvellously successful year;" and the expression is certainly no exaggeration, seeing that the profit balance attained the high figure of £88,000, notwithstanding a reduction of price, which was ordered, as may be remembered, by the City Council early in the present year, in opposition to the views of the majority of the Gas Committee, including the Chairman. Our own more hopeful view of the matter, expressed in these columns on Feb. 12 last, has been abundantly justified. An important part of Alderman Gibson's statement refers to the decision of the Committee to erect a 6 million cubic feet carburetted water-gas plant at their Bradford Road station, under the supervision of Mr. Corbet Woodall. It appears, from the Chairman's observations upon the subject, that this plant is intended to serve as a "stand-by" for meeting winter emergencies; and there can be no question as to the wisdom of the policy which dictated the provision. Whatever may be the case in regard to small works—as to which we speak with some reserve solely from absence of sufficient knowledge—experience has shown that a British gas-works of the first class in point of magnitude can very profitably and conveniently harbour supplementary water-gas plant. We notice that the output of the existing Manchester stations has been largely increased, while the working expenses have not been heavier. The Chairman stated that 130 million cubic feet more gas was made last year from the same quantity of coal as was carbonized the year before; and that there have been other gains. This is really remarkable progress; and it reflects an amount of credit on the working staff which we hope will receive proper recognition in due season. Meanwhile, the people of Manchester are to be congratulated on what looks like the dawn of a day of brighter things in regard to their gas supply; and we hope the Gas Committee and the Corporation will persevere in the effort to administer their great undertaking in the better spirit which manifested itself in them with the new year.

The Position of Licensees under the Welsbach Patents.

THE incandescent gas-burner is so widely and deservedly popular among gas engineers and dealers in lighting appliances generally, that the incessant litigation by which the developing trade in these burners and their "mantles" is attended must be regarded as in some respects a public concern. We do not comment upon the internal affairs of trading companies in these columns merely because they happen to deal in gas apparatus; but our readers must by this time be fully aware that the trade in Welsbach lamps is, at any rate in this country, troubled by many questions respecting licences and other matters which may well frighten people from having anything to do with these articles. It is for this reason that we now refer to the action of *The Incandescent Gas-Light Company, Limited, v. Cantelo*, tried by Mr. Justice Wills last Wednesday, and reported in our "Legal Intelligence" to-day. Unless the matters in dispute in this suit, and the exact nature of the points upon which judgment was given for the defendant, are clearly understood, there may be injustice done to the plaintiffs, and an extension of the mischief which the action was brought to cure. The broad facts of the case are these: The Company's patent practically consists of the "mantle" alone; and their royalty income has consequently to be derived from the sale of this part of the system. If, however, this were to be done directly by charging a sufficient price for the mantles, the public would not like it; because there is nothing more irksome than a heavy continuous outlay for the renewal of apparatus the novelty of which has worn off. By way of making a concession to human nature, therefore, and at the same time getting their royalties in as soon as possible, the Company have adopted the principle of taking their royalty out of the sale of the first burner and mantle, for which they can easily get their price, charging for subsequent renewal mantles only the figure which they think

returns them only a bare commercial profit. Naturally, the Company do not explain the character of this arrangement to purchasers of their burners and mantles; but they now paste upon the boxes containing the latter a notification to the effect that they may only be used by or on behalf of the purchaser, and not in connection with burners not supplied by the Company. It having come to their knowledge that their renewal mantles were being used for burners not of their own manufacture, and that the defendant Cantelo, who is an ironmonger in business at Sandown, was selling them for use with the burners of the Helio Company, the Incandescent Company took action against this individual to restrain his proceedings in this regard. Curiously enough, the action failed, on the ground, not that the plaintiffs had no right to place such restrictions as they pleased upon the way in which their specialties should be sold or used, but that the defendant had not sufficient notice of the existence of the restrictions which he had infringed. It came out in the evidence that the defendant had once been an agent for the sale of the Company's goods, at which time there was no notification of restriction of sale or use put upon the boxes—this particular way of evading the Company's claims not having then cropped up. He purchased of a London agent of the Company, through an intermediary, the parcel of mantles which were alleged to have been improperly used; and the fact of the notification in question being pasted on the boxes was not brought to his mind. Of course, when the boxes came into his possession, he saw it, and it was argued that he was thereupon bound by it; but the Judge, holding by a principle of immense public importance, said this was not so if the articles had been bought without full knowledge of the condition attached to their sale. The result of the action is hard upon the Company; but they will know what to do in future to prevent a repetition of the breach in their commercial defences.

The Affairs of the Imperial Continental Gas Association.

The half-yearly general meeting of the Imperial Continental Gas Association was held last Thursday, under the presidency of Sir Julian Goldsmid, when the report of the Directors was presented, and read by the Secretary (Mr. G. F. Thompson). The most interesting, in a general sense, of the matters dealt with in these reports is the information they convey of the course of the gas industry in the large and diversified field of operations covered by the Association. It is extremely satisfactory to learn that, notwithstanding the action of various inimical influences which need not be particularized, the recent experience of the Association has been that of continual growth and commercial advancement. Their accounts reveal an increase of 1·96 per cent. in the consumption of gas for the past half year, and of 3·85 per cent. in the number of lights served thereby. These ratios show what appears to be the universal law—that the modern extension of the utilization of gas is attended by an improved state of the methods and appliances of gas consumption. The Directors have adopted the prepayment meter system; and as they must be regarded as the pioneers of this manner of popularizing gas upon the Continent, it will be of great interest to watch the progress of the movement under their auspices. So far as the financial circumstances of the Association are concerned, there seems to be every reason for congratulating the Directors and the proprietors upon their continuance in prosperity. The very existence of an undertaking of this character, to say nothing of its success in business, depends very largely upon the possession and exercise on the part of the Chairman, Directors, and principal officers, not only of the administrative and commercial abilities necessary for the management of an ordinary gas company, but also of an exceptional degree of practical statesmanship. Nobody outside the headquarters of the Association can have the smallest idea of the variety or of the onerousness of what may be called the political branches of the work of the directorate and their chief advisers at home and abroad; and the proprietors—and we may add the communities they serve—are fortunate in the men upon whom the discharge of these duties falls in their name.

The South-Western Gas Managers in Winchester.

The members of the South-West of England Association of Gas Managers met last Tuesday in Winchester, under the presidency of Mr. F. G. Dexter, whose interesting Inaugural Address will be found in another column. It runs over a long and diversified course, and contains many thoughtful comments upon subjects of perennial interest to every gas manager. Especially to be commended for reading is the candid confession of experiences with stopped ascension-pipes, which probably awoke a responsive chord in the breast of more than one of the gas managers who heard Mr. Dexter dilate upon his gropings after the way of deliverance from this trouble. Mr. Dexter does not profess to know all about ascension-pipe stoppages; but he does know that, whereas he was once afflicted in this way, he is now free from the evil, and he tells how it was done. The exceptional character of the Winchester street lighting for many years lends point to Mr. Dexter's remarks upon this subject. We cordially agree with what he said about the folly and unfairness of certain Gas Companies who have adopted prepayment meters, only to revive in this connection the stupid "dragooning" of the consumer which gave many companies such a bad name in the past. There are yet in existence, unhappily, gas administrators who, rather than run the risk of making an occasional bad debt of a few shillings, will insist upon putting consumers under conditions which frighten away many, irritate more, and cost the company untold pounds in lost revenue, to say nothing of making enemies on every side. Altogether, the address is a very good one. Mr. J. S. Ineson, of Ventnor, read a paper which showed that some of those who go to this part of the world to work instead of to play and recuperate, do not find it in all respects an ideal field of operations. What with the unquiet sea, and the almost equally restless "blue slipper" which passes for *terra firma* in the Undercliff, Mr. Ineson has had enough to do to keep his works in the position intended for them; and his fortitude in facing his oft-recurring difficulties, and his resourcefulness in dealing with them, merit the highest praise. In connection with the gas affairs of the South-West, mention may be made of the loss suffered by the local Association and the industry by the death of the veteran Mr. Thomas Hardick, of Salisbury, which occurred last Sunday, and was notified to us as these columns were being passed for press.

Collapse of the Petroleum "Boom."

It must be permitted to us to remark with some little satisfaction that events in regard to the trade in petroleum have already taken the course forecast in these columns on the 23rd ult. Several correspondents have written us complimentary letters upon what they are pleased to describe as our foresight in this respect; but, really, it was not so much a spirit of prophecy that inspired our purview of the petroleum market, as scepticism, which has turned out to have been well founded, in the ability of the petroleum "boomers" to control the sources of production other than American. So far as the trade in gas oil is in question, we are informed that any quantity of Russian solar distillate is to be had, delivered in London or Liverpool at the price of 55s. per ton, which is an indication that the recent inflation did not touch the main sources of supply. Consequently, the friends of carburetted water gas in this country can continue to possess their souls in peace, regardless of the Standard Oil Company and all its works. We are just as ignorant as ever of the "true "inwardness" of the late "boom," and do not now greatly care to know it. The whole affair will speedily pass into the domain of ancient history; and who gained or lost by the agitated quotations of the past month is not a matter of commanding public interest. For one thing, nobody but the Standard Oil Company, who in this country are known as the Anglo-American Oil Company, is permitted to hold a stock of American burning oil; and consequently nobody else cares very much what becomes of the trade. If the controllers of this huge monopoly could contrive to join hands with the Russians, and lay an embargo on all the other sources of mineral oil in the world, the combination could effect something notable. But even in this practically impossible eventuality, there would be no reason for the price of gas oil being put up beyond the figure at which it is saleable for gas making. To the price of burning oil there is no particular limit. Probably quite as much of this class of mineral oil would find consumption at 8d. per gallon as at half this figure, at the hands of those who like it or are unable to do without it. But for gas oil there is a hard-and-fast limit of value beyond which it could

not be forced upon possible users; and this consideration must be the controlling one in the trade.

The Prosperity of the Nation.

THE general public has not been specially impressed with the Chancellor of the Exchequer's Budget speech; yet for deep significance some of the statements made in the course of this official presentment of the balance-sheet of the nation have rarely been equalled, and have never been surpassed, in parliamentary history. We desire to draw our readers' attention more particularly to the portions of the speech which deal with the economical condition of the people. During the past year, as is now usual, the community has been worried by the importunities of Socialist agitators, shrieking (in and out of season) their stock assertions about the increasing poverty of the poor, the failure of our industrial system to provide amelioration of the lot of the working population, the growth of the unemployed element in this population, and the alleged crying need that something should be done to mend matters in these regards. Sympathetic divines have been impressed by this clamour; "popular" newspapers have been induced to echo it; local authorities have been persuaded to listen to it. In short, many of those members of the community who could not honestly say that things had gone badly with themselves, became possessed of the disquieting notion that somehow they ought to be ashamed of being happy, when, as they were told, the great mass of the people of this country were all the time sunk in hopeless misery. Well, on top of all this comes the Budget speech, with its revelations that these miserable people managed last year to consume more, and also save more, than was ever before known. There never was such a prosperous year. Altogether, the suffering working classes of the United Kingdom are registered as owners of upwards of 240 million pounds sterling, invested in those institutions for taking charge of the people's savings of which the Government has cognizance. It may be just incidentally mentioned that the registered Trades Unions, which make more noise in the world than any other organization in this category, only hold £1,378,007 of this great total. Well might the Chancellor of the Exchequer describe these as "facts on which it is pleasant to dwell as "an antidote to that pessimism which delights to describe "the condition of the people as one of progressive deterio-"ration." They knock the bottom completely out of the case sought to be established for a radical change of the existing social and industrial system. The facts do not mean that "everything is for the best in the best of all pos-"sible worlds;" but they certainly teach us that there is no reason for the assertion that modern civilization is in a bad way, or that the course of the workaday world must be changed for another of which nobody has any experience. They show us, moreover, that there is time to improve existing arrangements in whatever respect these may be found defective. After the Chancellor of the Exchequer's revelations, there need be no wonder that Keir Hardeism, Tilletism, and the other Independent Labour "isms," down to and including Anarchism, fail to carry away the British workman "in his thousands." He is too well off. This is the best bit of news that has been given to the country through the agency of the House of Commons for many a long day.

Mr. R. Lamb has been elected Chairman of the Newhaven and Seaford Water Company in place of Mr. Farncombe, whose death was recently recorded in the JOURNAL.

Mr. W. C. Barnes, whose death is just announced from Buckhurst Hill, was one of the pioneers in the manufacture of artificial colouring matters from the substances contained in coal tar.

Mr. W. J. Andrews, of Woodbridge, who was a considerable holder of shares in gas companies in the Eastern Counties, died last Wednesday. He was a member of the Boards of the Ipswich, Harwich, and Beccles Gas Companies, and an Auditor of the Woodbridge Company. Mr. Andrews was in his 75th year.

Death of Mr. G. Lenny, of Lewes.—The death is announced, at the advanced age of 82, of Mr. George Lenny, of Lewes. Deceased had all through his long life taken an active part in public work; and at the time of his death, he was a Director of the Lewes and Eastbourne Gas Companies, while it is barely three months since that he resigned the office of Chairman of the Lewes Water Company. His accurate judgment and alert grasp of details, combined with his extended experience in company work, rendered him an invaluable colleague on the Boards with which he was connected.

WATER AND SANITARY AFFAIRS.

IN the JOURNAL of last week, we recorded the fact that the House of Commons had resolved, as proposed by Mr. James Stuart, that the Chelsea Water Bill should be referred to the same Select Committee which has charge of other Water Bills relative to the Metropolis. The effect of this decision is singularly mischievous, not only as affecting the Companies, but in its bearing on public interests. There is the risk that the Chelsea Water Bill will be swamped in the general inquiry connected with the Transfer Bills; and the consumers in the Chelsea district will be deprived of the benefit which would accrue from the works proposed by the Bill, including the laying of a new main. In the debate which preceded the unfortunate vote, Mr. Kimber remarked that the effect of the motion brought forward by Mr. Stuart would be to prevent the Chelsea Company from alleviating those miseries which consumers of water suffered during the recent frost. There is certainly something absurd in the conjunction of circumstances by which General Scott is appointed to make an official inquiry into the partial failure of the water supply during the late severe frost, while the President of the Local Government Board, who himself orders the inquiry, stands up in the House of Commons to support a motion directly hostile to a Bill intended to secure an adequate supply at all times in an important part of London. Mr. Shaw Lefevre wished to say nothing on the subject, but was so directly challenged by Mr. Long that he was compelled to offer an opinion, by saying that he thought the Committee would have time to deal with all the Bills; to which the members of the Opposition demurred, as they reasonably might. It is perfectly clear that there are two distinct questions in regard to this matter, one of which is urgent, while the other is liable to meet with delay, if not with entire rejection. London needs water, both in frost and in the Dog-days. For this purpose, immediate steps should be taken, where found to be necessary; while the academic question as to placing the supply in the hands of a public authority may be debated at leisure. How leisurely the County Council are disposed to deal with all but two of the Transfer Bills, appears by the action of Mr. Benn in the House of Commons on Friday last, followed by Mr. Stuart yesterday. Friday was the day appointed more than two months before as the date on which the six Bills should come on for their second reading. But when the day arrived, Mr. Benn, speaking on behalf of the County Council, suggested that the second reading should be adjourned until the ensuing Monday (yesterday), with the avowed object—not of forwarding the Bills through the specified stage—but with the express hope that, in the meantime, arrangements might be made for a further adjournment. Urged by Mr. Boulnois to adopt a more straightforward course, Mr. Benn suggested an adjournment for a month; to which Mr. Boulnois shrewdly replied that he would agree to an adjournment for six months, but not for one. The order for the second reading was then deferred until yesterday, when Mr. Farquharson moved that the debate on the second reading of the Chelsea Water (Transfer) Bill should be adjourned to a later date. Mr. Boulnois objected to the delay which had already taken place, and asked for some declaration of policy on the part of the County Council, so that the House might understand what was the intention of that body on the whole question. Mr. Stuart signified that he was only pursuing the course which he originally avowed. Mr. Banbury expressed a hope the House would insist that either the whole of the eight Bills before it should be taken into consideration or the whole of them dropped. Despite the appeals thus made, the second reading of the Chelsea Transfer Bill and the five others in the same position was further postponed until June 13.

The proceedings of the County Council in relation to the water question continue to bear the one aspect of an intention to acquire the properties of the Lambeth and the Southwark and Vauxhall Companies, without any immediate care for the rest. If the Council gain these two undertakings, they can wait for the remainder; and, in the meantime, they may bring forward their great scheme for an additional water supply, whatever purpose that may serve. If the Council had any real intention of buying up all the London Water Companies, there never would be this perpetual postponement of six out of

the eight Transfer Bills. The great contention is that the water supply of the Metropolis should be possessed by a public authority. The Council have made a show of acquiring the supply; but when action is demanded, they limit their attention to a couple of Companies on the south side of the Thames. They do not even propose to take all South London at once, but leave the Kent Company to the uncertain mercies of the future. This tortuous policy is obviously pursued for partisan purposes, irrespective of the public good. Otherwise, why is the Chelsea Bill, proposing necessary works, placed in peril, together with that of the Lambeth Company? Mr. Stuart has argued that the capital to be raised under these Bills will affect the terms of purchase. Of course, the Companies should be recouped their outlay. But the money will be well spent if required to maintain the supply; and a Select Committee of the usual type can decide whether or not the works are required.

That there is water to be had if the Companies are allowed to take it, is shown by recent statistics. While General Scott is being told how people have been without water for weeks together, owing to the freezing and bursting of the mains and communication-pipes in certain parts of London, the returns furnished to the Registrar-General show that the supply provided by the Metropolitan Water Companies during last March exceeded 229¼ million gallons per day, compared with less than 185½ million gallons in March, 1894. The increase this year was therefore nearly 44 million gallons per day, or more than 20 per cent.; while the increase in the number of services was less than 1½ per cent. The supply given by the Lambeth Company was increased by more than 5 million gallons per day; by the New River Company, above 6 million gallons; by the Southwark and Vauxhall, above 7 millions; and by the East London, fully 15½ million gallons. There was water, therefore, in abundance, whatever became of it; the bare excess on the total being sufficient for the ordinary wants of a population of a million and a quarter. The cost to the Water Companies must have been enormous, as every drop of water has to be pumped up by steam power; and the excess weight in March last exceeded 195,000 tons per day. What this amounts to in money we shall probably learn by-and-bye. Whatever it is, the pecuniary loss, together with heavy expenditure for additional labour, falls on the Companies; whereas had the supply been "municipalized," the County Council must have found the money, taxing either the consumer or the ratepayer for the purpose.

Have the County Council succeeded in conciliating the Corporation of the City with respect to the Transfer Bills? At the meeting of the Court of Common Council on Thursday, assent was given to a memorandum setting forth the agreement entered into at a conference between representatives of the County Council and the Corporation, as to the proportionate representation of the two bodies on the future statutory Water Committee. What is now to become of the Corporation petition against the Transfer Bills? That petition not only complained that the Bills omitted all reference to the Corporation and a Statutory Committee, but it went on to set forth certain weighty objections to the general scheme embodied in the Transfer Bills, especially with reference to the outer areas. Are the Corporation going to be satisfied with furnishing one-eighth of the members on the future Water Committee of the County Council? Are the outer areas henceforth to be left to fight their own battle, without representation on the Committee; and is the "transfer" to take place before the Committee is formed? Do the Corporation still consider the conditions of purchase such as "are not fair or "reasonable, either to the Companies or the consumers?" There is something strange about the whole of this business. The conference between the representatives of the County Council and the Corporation took place as far back as Feb. 28. Yet the resolution of the Council, adopting the arrangement as to the Statutory Committee was not arrived at until April 9; and the Court of Common Council pass their confirmatory resolution as lately as Thursday last. Delay, whether it happens to be justifiable or not, seems inherent in this water question, both in and out of Parliament.

Mr. F. Kemble has just been appointed Chief Engineer of the Kingston (Jamaica) Gas-Works and of the Kingston and Liguanea Water-Works. Mr. Kemble had been discharging the duties.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 969.)

THE general result of the past week's trading on the Stock Exchange is to leave prices better than they were found at the opening, though business was not particularly brisk (the mining world always excepted); and the tendency was not uniformly upward. The fluctuations seemed to proceed from alternate phases of determination to take a bright view of the Eastern imbroglio, and of relapses into despondency. However, between hopes and fears, there appears to be a preponderating feeling that matters will somehow come out all right in the end. The higher-class securities were in good demand, and improved in value—some people probably storing up their winnings in the mining game; and the depressed Americans are smiling again. *A propos* of winnings, the Chancellor of the Exchequer, with his quarter of a million from stamps on transfers, is among the chief gainers. The Money Market is holding up very well. Business in the Gas Market was bright and active; and quotations still continue pressing upward. In Gaslights, there were numerous and extensive transactions in the "A" stock, which, after steadily holding its position in the face of a good many sales, established an advance of a couple of points. All the secured issues dealt in commanded excellent figures—good enough to warrant higher quotations. But the latter were left standing. Only a moderate amount was done in South Metropolitans; and prices were a good average. Very little was marked in Commercials; but the old stock changed hands at top price. The few transactions recorded in the Suburban and Provincial Companies showed the good favour in which they stand; Brentfords being very conspicuous. Business in the Continental division was rather quiet. The general tone was firm; while Union made a nice advance. The minor and more distant undertakings were mostly devoid of feature; but Melbourne bonds made an advance, in sympathy with the general Australasian improvement. Water stocks were very flat, and too free an offer caused some of them to be put down with an unsparing hand.

Daily operations were: Business in Gas opened on Monday with a very fair show of activity, mostly in Gaslights—the prices for the secured issues being particularly good; but quotations did not move. The Water fall began with a drop of 2 in each Southwark issue. Gas was rather quieter on Tuesday; and quotations again remained steady. The weakness in Water produced a loss of 5 in New River; and 1 each in East London and Lambeth. Wednesday, being the 1st of May, was a close holiday. Business in Gas was resumed with renewed vigour on Thursday; and prices were strong. Melbourne bonds rose 1. Water was unchanged. Gas continued brisk and buoyant on Friday; and Gaslight "A" advanced 2. In Water, New River and Lambeth fell 5 each; and Grand Junction and West Middlesex, 1 each. On Saturday, the only change in Gas was an advance of 3 in Continental Union; but, in Water, Lambeth receded 2 more.

ELECTRIC LIGHTING MEMORANDA.

Depreciation and the Repayment of Municipal Electric Lighting Loans—Mr. R. E. Crompton on Cooking by Electricity—A Question of Electrical Distribution.

IT is a satisfaction to have an independent electrician's views of the subject of depreciation allowances in respect of the electric lighting undertakings of local authorities, as to which the policy of the St. Pancras Vestry was recently declared, and commented upon in our "Electric Lighting Memoranda" a fortnight ago. The *Electrician* remarks on this matter that the St. Pancras idea "that the amount repaid annually off municipal loans is in reality equivalent to the setting aside a sum for depreciation, is a correct one, so far as it goes." The qualification is, however, expressed that anybody managing such a business upon a sound commercial basis would ask whether the loans are being repaid at the same rate as the plant is wearing out or becoming obsolete; and the conclusion is arrived at that in the St. Pancras case they are not. Our contemporary points out that while some of the objects upon which the capital in question has been expended may not depreciate at all, and others would depreciate very little, there still remains a large and costly class of plant which has but a short life; and it does not consider an average of 2 per cent. over the whole a sufficient sum to set aside every year. "Unless, therefore, the Electric Lighting Committee of the St. Pancras Vestry can see their way to replace certain portions of their plant from time to time out of revenue as they become worn out or antiquated during the next 42 years, they will find that the repayment of the existing £110,000 loan spread over a like period will not be equivalent to what should be set aside for depreciation each year by a soundly-managed commercial undertaking." Consequently, the Committee are warned that they will probably find it necessary to increase the rate charged for current, or preferably to effect further economies, with a view to provide a depreciation fund. If only the rate of repayment of loans spent

upon perishable plant required by the London County Council, with the concurrence of the Treasury, were carried out by the St. Pancras Vestry, "the sum which would have to be set aside this year for repayment of loans would completely wipe out the balance of £1754 now carried forward and leave a small deficit." This cannot be pleasant reading for the ratepayers.

The paper on "The Use of Electricity for Cooking and Heating," read on the 24th ult. by Mr. R. E. Crompton before the Society of Arts, was warmly applauded by an interested public of electricians, who would dearly like to see a wide extension of such applications of electricity. Credit is due to Mr. Crompton for the candid and careful way in which he got up the facts for his paper. He realized the gravity of the initial difficulty of the great cost of obtaining heat by resistance to the passage of current, which is, of course, the fundamental principle on which all electrical heating arrangements depend; and he did not try to at all minimize the consideration. But he endeavoured to prove that the economy in utilizing heat so obtained is so superior to anything that a coal or gas cooker can show, as to turn the scale in favour of electrical apparatus. Mr. Crompton did this part of his work very well; arguing that while only 2 per cent. of the heat of the solid fuel consumed (say) under a grill is utilized in cooking a chop, and while at least 80 per cent. of the heat developed by burning gas in a cooker goes off by the way of ventilation, "with a properly arranged griller heated by electrical means fully 70 per cent. of the heat-energy in the electricity is used in the meat." This may be quite true; but the question for the consumer will still be which is, on the whole, the cheapest and handiest means for cooking the chop, or half-a-dozen chops. It is easy to amuse a lecture audience with statements of percentages of energy utilized; but more lasting effect would have been produced if Mr. Crompton had been able to say that he had been able to replace advantageously for all parties concerned, with one of his electrical grillers, a single one of the thousands of "silver grills" in daily use in London restaurants. We notice that even Mr. Crompton gave up the idea of employing electricity as a means of heating the water required for household purposes—and wisely, for we do not mind confessing that this duty is still the gravest problem to be solved by those who would popularize gas fuel for all domestic requirements. Experience has proved that the cost of fuel of any kind for mere roasting, baking, frying, or grilling, is the merest trifle in comparison with that of general water boiling, especially for "washing up" and other kitchen requirements. And the electrician has not even a "geyser" for getting a hot bath without the aid of that necessary evil, the circulating boiler.

The municipal authorities of Berlin are not much troubled with street-box explosions, but they look after the electrical distribution plant in the city with a keen eye for possibilities. The police regulations still prohibit the laying of bare conductors, although in the autumn of last year the municipal authorities, in the interest of public safety, required the connection of the middle wire, in three-wire systems, to earth. All cables are insulated from the pipes and other metallic masses in the streets. For the prevention of explosions, those due to electrolysis through water entering the boxes are prevented, as far as possible, by keeping these water-tight, while automatic signalling appliances are in use, which give warning at the central stations not only of direct mechanical injury to the cable, but also of the entry of water into the boxes and the occurrence of insulation faults. This method of control has proved to be an important factor of safety. Major Cardew's advice has been anticipated in the matter of reducing air spaces as much as possible; and where this course has not been practicable, adequate ventilation by means of openings, specially looked after during frosty weather, has been provided. In connection with the moot question of the advisability of earthing the middle wire, it may be recorded that this expedient is strongly recommended in a report signed by Dr. Slaby and Mr. Gisbert Kapp on behalf of the German Electro-Technical Association to the Town Council of Altenburg. There appears to be a strong prejudice against this course on the part of English electricians; and the Board of Trade forbid it. It is recommended chiefly on the score that when it is done, if anything happens, the disturbance is quickly made known, and its effects localized. On the other hand, it is argued that there should be no impossibility in maintaining complete insulation throughout a three-wire system, in which case there would be, at any rate, freedom from electrolytic troubles, in which gas and water pipes might be expected to play a part.

Decline in the Price of Petroleum.—According to a telegram, dated the 3rd inst., from the Philadelphia Correspondent of *The Times*, petroleum declined in price all last week. The Standard Oil Company reduced the buying figure to $1 70c.; while the quotation in Pittsburgh and Oil City went down to $1 63c., and closed at $1 58c. with small sales.

Mr. James Fleming, the Treasurer of the Glasgow Gas Trust, has had his salary increased by £100 per annum. Mr. Fleming was promoted to the treasurership some five or six years ago (on the resignation of Mr. Ross), at an advance on the amount he was then receiving; and he had a further addition of £100 when the financial business of the Corporation electric lighting undertaking was added to the work of his department.

AN AMERICAN ON BRITISH MUNICIPAL GOVERNMENT.*

In the April number of the American *Engineering Magazine*, which is generally conceded to be a publication of considerable merit, there appears an article by Mr. M. J. Francisco on "Municipal Ownership of Public Corporations," written from an American standpoint, based upon American examples, and addressed primarily to an American public. It concludes with the declaration that "the time for municipalities to own and conduct commercial industries has not arrived, and will not arrive until men are born into a world where politicians and aldermen protect taxpayers and refuse 'boodle;' where children are removed from parental influence and nurtured by the State, as advocated by Plato; where employees, with no interest in the business except to aid the political bosses and draw their salaries, can conduct the business more economically and successfully than men who have perhaps every dollar of their fortune depending upon its success; where, in fact, the Millennium arrives, and the whole human family is transferred to some eternal city lying beyond the misty shore of time. Until that times comes, let all cities confine their business to regulating and governing; leaving commercial industries, with their hazards and losses, to individuals and private corporations." It may be assumed that these observations are justified by the circumstances, or they would have hardly been permitted to stand as they do for a summing-up against the contemporary movement in the United States, the existence of which is admitted in the beginning of the article, "demanding that Governments (state, national, and municipal) shall own and conduct all large commercial enterprises."

By way of comment upon Mr. Francisco's view of the functions and characteristics of the governing bodies of the United States, we have the book we are about to notice, wherein Mr. Albert Shaw, another American, gives an account of the working of municipal institutions in Great Britain. It is a record of observed and noted facts, taken from contemporary civic life in a land which is not Utopia, and where none of the other conditions mentioned by Mr. Francisco as essential to the effective realization of his initial stipulation is either supplied or wished for. The first question to be asked with regard to municipal government is: What does it mean? The age is past when self-centred philosophers thought they were doing the world some service by asking questions about government, social life, and similar matters, only to answer them by proposing, upon general principles and "the laws of reason," some solution evolved from their own inner consciousness for the problem suggested by the inquiry. Those who would serve their generation to this end now proceed by a different way. When anyone asks nowadays what is municipal government, the approved manner of answering is to refer to examples of what is practically understood and done under the name by those communities who have given proof of knowing most about the subject. Occasionally, such information is supplemented, as in the case of Mr. Francisco's article, by references to examples illustrative of "how not to do it." Both kinds of teaching are valuable in their way; but the former is naturally more helpful, as assistance is more fruitful than warning.

In the beginning of a study of such writings as those of our two writers upon municipal government, we are confronted by the admission of the one that the term "would seem ill adapted to embrace at once the mechanism and the varied tasks of modern municipal corporations"—that is, of Great Britain; whereas the other declares roundly that municipalities should "confine their business to regulating and governing"—that is, in the United States. The observation immediately suggested by this contradiction of opinion is that the question of what a municipality should do depends very greatly upon what it can do, and do as well as, or better than, any other executive agency. For the needs of cities, wherever situated, must on the whole be pretty nearly the same. It is impossible to set bounds to the growing development of civic demands; and equally impossible to say beforehand how these had best be satisfied. If, therefore, a student of municipal institutions in a particular country sees the governing body doing all sorts of things, the presumption is that this has proved a natural and acceptable way of doing them. Why, then, should apparently similar bodies elsewhere be restricted to the performance of strictly limited functions, if not because they are not deemed fit to be entrusted with the performance of larger duties? But here the further question arises as to whether such circumscribed bodies are really fit to bear the limited responsibilities thus contemptuously left to them; and the answer is not at all a reassuring one. If it were certain that a civic body confined to the performance of its elementary duties of "regulating and governing," as Mr. Francisco puts it, was competent to bear this responsibility as it ought to be borne, there would be no particular reason for the limitation. If, on the other hand, the multiple-functioning municipality failed of its elementary duties in government, there would be excellent reason for cutting down its activities to those of the first importance. It is the strength of the case for extended municipalization that the most highly-developed municipal governments do all their work better than

* "Municipal Government in Great Britain." By Albert Shaw. London: T. Fisher Unwin; 1895.

those which are less advanced. It is really a matter of quality rather than of degree; and it is as difficult to set bounds to the activities of good municipal governing bodies, as it is to say what can safely be left to the control of bad ones.

Why are American local authorities so inefficient that Americans themselves think the less that they have to do, the better for the community? Altogether apart from reasons connected with political and ethical considerations which we had rather say nothing about, it is, as Mr. Shaw perceives, in great measure because "many citizens who desire sincerely to aid in the regeneration of their town life and neighbourhood affairs have formed no definite municipal ideals. They have neither learnt what in the experience of the world has come to be regarded as a sound constitution or framework of municipal government, nor have they made up their minds to what positive tasks and public services a municipal government may wisely apply itself." Very prudently, Mr. Shaw hastens to protest that he has no desire to prescribe European remedies for American maladies, nor to suggest any degree whatsoever of imitation. "We must deal with our own problems in our own way." This is a wise and statesmanlike position to take up. At the same time, he contends that people situated like the Americans should be willing to learn from the experiences of other nations.

We in this country are in very much the same case. We want to learn, from our own experience as well as from those of other peoples, lessons for the safe guidance of those tol whom the conduct of the affairs of British communities will fal in the future to which some among us look with apprehension and others with extravagant hope. Power has descended upon an order of our countrymen hitherto unacquainted with its responsibilities, and peculiarly liable to be led away by flattering busybodies concerned only to prate of its rights. Since it is a great truth that "that which has been is that which shall be," the utility of such studies as those in which Mr. Shaw has been engaged cannot be questioned. And it is a great comfort to have, as an introducer of others to the same order of studies, so cheerful, sane, and intelligent a writer as Mr. Shaw. So far as we are aware, he is among the first of writers upon social and economical subjects to perceive and make proper allowance for the modern influences of civilized life which destine the race, "for the great majority, to live in cities, or under conditions more or less strictly urban." The observation itself is, of course, a commonplace; but it is Mr. Shaw's distinction to have faced the necessity, not as though it were wholly unobjectionable, but with a resolute intent to show how it may be met, and the worst of the consequent evils removed. He points out that the present evils of city life are temporary and remediable. From the time when people began to crowd together in towns, this crowding has been attended by a host of inconveniences and mischiefs of all kinds; but there is no real necessity for them, or for most of them. They are the effects of ignorance, carelessness, callousness, and selfishness; but they must yield before science and good-will. But, in order that the remedy may be most effectually discerned and applied, a new category of science must be called into existence—the science of the city. "The so-called problems of the modern city are but various phases of the one main question: How can the environment be most perfectly adapted to the welfare of urban populations?" Only, to answer the question, the science of the ordering of common concerns in dense population-groups is really necessary; and this "includes administrative science, statistical science, engineering and technological science, sanitary science, and educational, social, and moral science." And the striking thing about it is that this new scientific category has been brought to the highest perfection it has yet attained anywhere by the very people who would be the last to classify themselves as scientific persons—namely, by the aldermen and town councillors and members of local boards of health throughout Great Britain, and their professional advisers and officials. In the same way as M. Jourdain found he had been talking prose all his life without knowing it, so these practitioners of "the science of the city" have not only been doing their daily duty to the community according to their lights, but have at the same time constructed and exemplified the working of a highly important department of social science. "The great towns have sprung up with magical rapidity everywhere; but not with magical order and completeness. Nobody had wisely anticipated their development; and they came into being as great hives of industry, sufficiently organised for temporary purposes of industrial production, but ill-organized—even chaotic—as regards comfort, health, and the various amenities of civilized life." Everything had to be done, and much yet remains to be accomplished. But not a little has actually been done to minimize the evils and maximize the advantages of urban life; and it is this section which Mr. Shaw sets himself to describe.

For one thing, he agrees with Dr. Flint, whom he may have read, that there is no Socialism, properly so called, in the fact of many subjects of common interest having passed under the direct control of municipal authorities. This looks somewhat like Socialism; and professed socialistic writers, with their incurable habit of jumping to large conclusions from slight premises, invariably treat of it as Socialism. But Mr. Shaw sees rightly that, "when strictly analyzed, modern municipal Collectivism does not so very seriously transgress the valuable old principles of individual freedom and private initiative and the household basis of economic and social life." He might have said that it does not transgress the principles named by a hair's breadth. That there is some Collectivism in the theory and art of modern city-making, however, is abundantly clear. Cities are becoming more conscious of being entities; and their inhabitants are realizing ever more and more that they have something as citizens which does not belong to them as individuals, and even as subjects. We have already, however, occupied all the space we can spare at present for discussing Mr. Shaw's book, and must postpone to another occasion notice of what he has to say respecting the nature of this civic property.

THOMAS HARDICK.

It is our sorrowful duty to announce the decease of Mr. Thomas Hardick, of Warminster. This regrettable event severs a link of connection with the past as well as the present generation of gas engineers. Though within a few weeks of reaching the 90th year of his age, he was still to an extent in active work as Manager of the Salisbury Gas Company, in which connection, perhaps, he is best known to our readers.

In personal character he was genial, kindly, sympathetic. To all engaged under his control he was a father rather than a master. His pocket as well as his sympathy was always at the service of those in need; and, both in public and private life, he exercised a large measure of that free-handed benevolence of the kind in which the right hand does not know what the left hand does. He was a man of high principle and moral character, coupled with great natural shrewdness and intellectual power. As a financier his abilities were remarkable; and the success of the undertakings for which he was responsible was to a great degree indebted to his aptitude in forecasting expenses and earnings. The infirmities of age crept slowly and grudgingly upon him. About twelve years since he was for a time laid aside by illness; and this necessitated an alteration in his active business habits. But he had been accustomed to take the journey between Salisbury and Warminster (a distance of 20 miles), in order to attend at his office, on almost every working day up to the last few weeks, with the exception of occasional periods of illness which had gradually become more frequent. He was present at the half-yearly meeting of shareholders last February; and he wrote out the report for the recent monthly meeting of the Directors. While it has been evident for some time past that his vital powers were slowly but surely failing, there was no reason to suppose that the end was so near.

Mr. Hardick commenced life as an architect; and he attained considerable eminence in the profession. Subsequently he was engaged in connection with the formation of the Great Western Railway, and was pressed to remove to London and take up a permanent position on the staff. He, however, refused to leave his native town—a determination that he has rigidly adhered to. He was frequently in contact with Brunel and other prominent railway men of that day. About the year 1847, he was appointed Manager and Secretary of the Warminster Gas and Coke Company, which office he continued to hold until his resignation, on account of old age, in 1893. One of his first experiences was the negotiation for the removal of "White's hydrocarbon process" which had been under trial at the Warminster Gas-Works. While in London on other business, he became acquainted with most of the gas engineers of that period; and he was on terms of intimacy with Barlow, Lewis Thompson, William King, and others, whose names have now passed into history. He witnessed the inception of the Journal in 1849, with hearty sympathy; and he continued a subscriber and warm supporter ever after. His name is in the "Correspondence" column of an early number. About this time, also, he was moving in favour of Gas Managers' Associations; and he made several visits to various gas-works with this end in view. So far from receiving support or encouragement, the idea was generally rejected; and in some instances he was not even allowed to inspect the gas-works. In 1862, he was invited to accept the post of Manager to the Salisbury Gas Company. The affairs of that concern were then at a low ebb, and the capital was selling considerably under par. But, under his direction, an alteration was speedily effected; and Salisbury soon became noted as a place for cheap gas and full dividends. The British Association of Gas Managers was founded about this time, and received his cordial support, together with that of the late Mr. Henry Cockey, with whom he was always on terms of the most intimate friendship. To these gentlemen, the Association was indebted for a large accession of members from the South-West District. Mr. Hardick remained a staunch supporter of The Gas Institute throughout its more recent vicissitudes. The South-West of England District Association of Gas Managers has always been, so to speak, "under his wing." The present Secretary (Mr. Norton H. Humphrys) accepted office at his request, with a promise of personal aid and support, which promise was always faithfully fulfilled. Only last autumn, although too unwell to attend the whole proceedings, he appeared at the Frome meeting for a few minutes, for the purpose, as he expressed it, "of shaking hands with the President."

WHAT ARE WATER-WORKS WORTH?

The Sheffield Water-Works Purchase "Precedent."

THE history of the compulsory purchase of water undertakings has, up to a certain point, been traced in recent issues of the JOURNAL. It remains to notice some special features connected with the acquisition of the Sheffield Water-Works by the Sheffield Corporation; and to recall in particular the bearing of that precedent upon the question of sinking funds—a question of marked importance in relation to potential purchases now before the public.

The campaign in which the Sheffield forces engaged commenced, as all such campaigns do, with imputations of mismanagement, or failure of duty, against the Company. Thus, and ever thus, does an acquisitive Corporation seek to pave the way to the possession of other people's property. In the Sheffield case, as in so many others, the charges fell to the ground; in fact, before the conclusion of the fray, they were frankly dropped by the Corporation. But, although blame and reproach were undeserved, no one who is acquainted with the history of water supply in Sheffield can possibly doubt that the Company in its parliamentary battle was heavily handicapped by reason of past difficulties; because, in order to obtain a fresh lease of life, it was necessary for the Directors to seek for a continuation of privileges which, when originally granted by Parliament, were intended to be of only a temporary character. It is not our purpose to travel over the whole field of controversy which engaged the attention of the Select Committee on the rival Bills; but, as aptly illustrating a common experience, it may be permissible to quote a passage from the evidence given by Sir Frederick Bramwell. "It was a very common story," said Sir Frederick. "A body of gentlemen came to a town, and supplied it with water. The works increased; and when they came to Parliament for increased powers, they were opposed on the ground that the works 'ought'—he never could see the reason of that 'ought'—to be in the hands of the Corporation." In other words, it meant at Sheffield what it means now at Portsmouth and elsewhere—that the Company had the works and the Corporation wanted to have them. Herein lies the pith of the whole matter; and its significance is that in these days many people seem disposed to regard every Local Authority as a sort of Municipal Juggernaut.

One of the principal witnesses examined in the interest of the Sheffield Corporation, estimated that, if the works were bought for £1,600,000, it would be buying a net income of £51,434. But he admitted that the charge for income and sinking fund for 60 years would amount to £76,760; thus showing a deficit of over £25,000 a year. Clearly, therefore, the only way of making out a saving to the current generation of ratepayers was on the assumption that the Standing Orders of Parliament would be suspended, so as to permit of a provision for spreading the repayment of the borrowed purchase-money over a period of not less than 90 years. It is well to bear in mind that the House of Lords Committee declined, in the first place, to sanction this inroad on parliamentary usage. The rule of Parliament, moreover, is consistent, and identical with the statutory rule prescribed by the Public Health Act, 1875, which contains various provisions to meet the case of the sale of a water undertaking pursuant to mutual agreement. It should be borne in mind that neither that Act nor the amending Acts contain any provision for compulsory purchase; and, though the unwritten law of so-called "public policy" favours the transfer of water-works from Companies to Local Authorities, it is still necessary that each particular case should be dealt with in the light of its own merits or demerits. Under the Standing Orders, and under the Act of 1875, the rule is one and the same where a purchase is to take place—namely, that 60 years as the period of redemption is the term, and the only term, that has the sanction of general authority.

The more frequent the yielding of the powers that be to the clamour of the municipalists, and the oftener there is made an exception to the general rule in regard to sinking funds, the less and the weaker becomes that security of tenure which is at the root of all successful private enterprise. Strong and dangerous deductions may be made from the action of Parliament in the Sheffield case; but the result should be considered in the light of the explanatory remarks which Lord Derby, as Chairman of the Committee, afterwards felt constrained to offer in the House of Lords. The Lords it may be inferred, were ready to yield to the House of Commons in the matter of the sinking-fund—apparently much against their better judgment. And the House of Commons had given way in spite of the vigorous warning of Mr. Courtney, the then Chairman of Committees. Mr. Courtney expressly laid it down that the concession to the Sheffield Corporation was not to be regarded as an abrogation of the general rule imposed by the Standing Orders, but as an exception, which ought on no account to be relied upon as a precedent in future cases. Yet what is the fact? In London and in the Provinces, it is again and again confessed, by those who advocate purchase schemes, that ratepayers of the present generation will be heavily burdened unless the repayment of purchase-money can be spread over 90 or (sometimes) 100 years. In other words, unless the rule to the contrary is to be honoured in the breach rather than in the observance, these purchase schemes are, from a financial standpoint, completely out of court. This is a feature of the position which immensely strengthens the hands of the Companies, and must proportionately hamper the Corporations in their attack, whenever they come into the open.

Finally, the actual terms arrived at in the Sheffield case should be noted. The Corporation took over the Company's debenture debt, agreeing to pay the same rate of interest to the debenture-holders. The holders of the 4 per cent. preference shares were to be entitled to annuities at the same rate of interest; and the holders of the 5 per cent. preference shares in like manner, received annuities at 5 per cent. for every £100 of share capital. To the ordinary shareholders, alternatives were offered. They might have, for every £100 of capital, an annuity of 2 per cent. during the years 1888-89, subsequently rising ¼ per cent. every two years until 1894, and thenceforward 4 per cent.; or it was open to them to take a fixed annuity of £3 for every £100, as from the 1st of January, 1888; or, finally, they might claim an out-and-out payment at the rate of £82 per cent. on the last-mentioned date. It should be added, however, that power was taken by the Corporation to extinguish the annuities at any time by mutual consent, and (after the year 1947) to settle with the annuitants on the basis of 25 years' purchase.

The Management of the Rotherham Corporation Gas-Works.—The Rotherham Town Council have adopted recommendations of the Gas Committee that Mr. Matthew Murdock be appointed Manager of the gas-works at a salary of £150 a year, with house, and that the remuneration of Mr. Bellamy, the Secretary, be increased to £220 per annum. [Nothing has yet been decided as to the appointment of a new Water Manager.]

Coal in the Faroe Islands.—In several of the Faroe Islands, there are coal deposits, more especially in Sudero. Through a long series of years, researches and tests have been going on without, however, very much result; and the rights have changed hands more than once. It appears that a Syndicate has now the matter in hand; and while Professor Johnstrup, the Danish geologist just dead, estimated the deposits as containing upward of 50 million tons, the last report brings the figures up to some 225 million tons in Sudero alone, in addition to which there are deposits of iron and copper ore, &c.

Death of Mr. F. J. Baynes.—We regret to record the sudden death at Las Palmas, on the 16th ult., from congestion of the lungs, of Mr. F. J. Baynes, formerly General Manager of the Ystrad Gas and Water Company. Mr. Baynes was appointed in 1888; and under his supervision both of the Company's gas-works were extended in accordance with his designs—a considerable increase of business following. Being quite a young man, a successful career seemed to be before him; but, owing to his health breaking down, he was compelled to resign his position last November, in order to try the effect of wintering in a warmer climate. Unhappily, the change, instead of proving beneficial, was attended by fatal results.

Eastern Counties Gas Managers' Association.—It has already been mentioned in the JOURNAL that, owing to the illness of the President and Secretary of the above-named Association, it was necessary to postpone the spring meeting. We now learn from Mr. H. Wimhurst that it will be held in the Town Hall, Sudbury, by permission of the Mayor (Mr. R. Mattingly), on the 15th inst., under the presidency of Mr. C. W. Grimwood, the lessee of the gas-works. After luncheon, provided by the Directors of the Sudbury Gas Company, in the Town Hall, the business will commence at two o'clock. Four new members will be proposed for election; the President will deliver his Inaugural Address; and Mr. A. Drage, of East Dereham, will read a paper on "Gas-Works Construction." At the close of the proceedings, the members will dine together at the Rose and Crown Hotel.

Liquid Gas Enrichers.—Last Friday evening, Mr. T. Stenhouse, F.I.C., F.C.S., read a paper on the above subject before the Manchester Section of the Society of Chemical Industry. He referred to the great differences between the published statements respecting the various liquids now employed for carburetting ordinary coal gas, and described a small apparatus which he has used for volatilizing and determining the efficiency of certain hydrocarbons for enriching gas of 15 or 16 candle power instead of using cannel coal for this purpose. The gas, after being measured, was passed through the enriching apparatus, and thence to the Argand burner of the photometer. The liquid of which the light-giving value was being determined was added uniformly during the test, which generally lasted half an hour. The quantity of the liquid required to give a certain improvement to the gas was measured from a burette. A Methven 2-candle screen replaced the ordinary candles, so as to avoid trouble with the latter during the testing process. Working in this way with the apparatus, it was found that 1 gallon of pure benzol gave an improvement of 1 candle on 13,300 cubic feet of gas; of commercial benzol, 12,500 cubic feet; of carburine (·680 sp. gr.), 5700 cubic feet; and of common petroleum spirit (·700 sp. gr.), 4300 cubic feet. Mr. Stenhouse stated that he found benzol to be the best and cheapest enricher, and that in using it on a large scale there was nothing to fear from condensation as 1 cubic foot of gas is capable of permanently retaining upwards of 50 grains of benzol vapour, even at a temperature of 32° Fahr.

NOTES.

The Protection of Iron and Steel by the Gesner System.

The Gesner method of protecting iron and steel from rusting is described in *La Revue Scientifique*. The principle of the process consists in forming on the surface of the metal treated a double carbide of hydrogen and iron, which is extremely hard and adhesive. In carrying out the process, the articles must first be thoroughly cleaned from rust; but it is not so essential that all oil or grease should be removed from their surfaces. The treatment is effected in a pair of gas-retorts, set side by side, and raised to a temperature of from 600 to 700° C. The articles to be treated are placed in a retort for about 20 minutes, when a current of hydrogen is turned into the retort, and kept on for 45 minutes. Then a small quantity of naphtha is introduced; the supply being kept on for 10 minutes. The naphtha is then shut off; a current of hydrogen being turned on for 15 minutes longer, when the process is finished. All that remains is to cool the retorts down to 400° C.; and as soon as this temperature is reached, the retort-lids can be taken off and the product removed. The coating thus produced has a bluish colour, and is stated to be so adherent to the metal that a treated bar can be bent through an angle of 45° without disturbing it. The thickness of the protective coating is not stated.

The Extent of the British Coal Measures.

Some discussion upon the question of the age of the earth's crust has been going on of late in *Nature* between Lord Kelvin, Professor Perry, and others. The arguments as to the age of the earth's crust, and of life upon it, are based upon geological and physical considerations. The geologists declare that the vast thickness of fossiliferous rocks can only have been deposited during many millions of years. Calculating from experiments upon the rate of cooling of certain rocks, Lord Kelvin found that 100 million years have elapsed since cooling began; but there is a possible maximum of 400 millions. Professor Sollas gives a table representing the maximum thickness of all known formations down to the base of the Cambrian, which constitutes a definite horizon; and the total thickness is 164,000 feet. Professor Sollas refers, in the course of his remarks, to the coal measures of the British Isles. Upon the supposition that these cover, to the depth of half a mile, a circular area 300 miles in radius, having its centre somewhere over Anglesey, their volume would be 141,372 cubic miles. Adding to this 15,876 cubic miles for the deposits of greater thickness occurring over the North of England, and South Wales and Somersetshire, gives a total thickness of 157,248 cubic miles. But since the maximum thickness is 12,000 feet, these will have accumulated (upon the assumption of one foot in a century) in 1,200,000 years. From this and other premises, Professor Sollas concludes that the lapse of time since the beginning of the Cambrian system is probably less than 17 millions of years. Whatever additional time the calculations made on physical data afford, Professor Sollas is willing to put to the account of pre-Cambrian deposits, of which we know too little to serve for an independent estimate. The subject is mentioned here for the light it throws upon the debated question of the extent of the British coal measures. It is evident that if Professor Sollas's estimates are even approximately correct, the supply of British coal may be regarded as being practically inexhaustible. Whether it could all be mined is another question.

A New Thermo-Battery.

A further attempt to make a thermo-chemical galvanic cell has been described in the *Comptes Rendus* by M. Désiré Korda, who worked with ordinary gas-retort carbon. M. Korda finds that, if barium peroxide is heated to redness in contact with a carbon plate, the oxide becomes reduced to baryta, with the attendant phenomenon of a difference of electrical potential of about one volt; the carbon plate being negative. A similar result was obtained with cupric oxide, when a layer of potassium carbonate was placed between the oxide and the carbon; the difference of potential in this case amounting to 1·1 volts. In these experiments, the plate of retort carbon was connected by means of a platinum wire to one terminal of a Richard voltmeter; and a few cubic centimetres of the salt operated upon were placed on the carbon. A platinum wire dipping in the salt served to complete the circuit. The carbon was heated to a dull red in an atmospheric gas-flame, when violent effervescence took place; carbonic acid being given off, and the voltmeter showing a deflection. This deflection of the needle remains constant as long as any of the higher oxide is left upon the carbon. The experiment is at any rate a simple one.

The Trade in Compressed Gas.

Recent occurrences have caused the public to look askance at the trade in compressed gas stored in steel cylinders; and to allay the uneasiness due to the Fenchurch Street Railway Station explosion, Mr. H. Joshua Phillips has reported in the *Engineer* upon the character and extent of this trade. He states that an enormous traffic goes on in portable cylinders of compressed hydrogen, coal gas, oxygen, carbonic acid, ammonia, chlorine, nitrous oxide, sulphur dioxide, and sulphuretted hydrogen; and, in comparison with the immense trade, the number of accidents is very trivial indeed, and reflects greatly upon the manufacturers for the precautions they take to ensure safety. Two of the largest dealers in compressed gases in the United Kingdom are Brins Oxygen Company, and the Carbonic Acid Gas Company, whose works are at Clapton. At the works of the former Company, oxygen and coal gas are compressed; and Mr. Phillips certifies that both the manufacturing and compressing plants are in every way safe and satisfactory. At these works, all cylinders are emptied of gas before being re-charged. The oxygen and coal gas charging plants are quite separate; the cylinders are painted different colours; and the fittings of the machines are not interchangeable. At the Carbonic Acid Gas Company's works, the whole of the product is obtained by the oxidation of gas coke by the atmosphere in a furnace of special construction. The products of combustion are brought into contact with a solution of carbonate of potash, whereby the carbonic acid is absorbed, and the gases not absorbed are led away by a flue. The resulting solution of bicarbonate of potash is heated, when carbonic acid comes off 99·75 per cent. pure, and is stored in gasholders before being compressed. No other gas can get into it; and the cylinders are tested to three times the highest working pressure. During the six years this business has been in operation, not a single cylinder has burst, though on one ocasions, at a fire in a North London warehouse, some charged cylinders packed in wooden boxes were in the place at the time. Last year the output of the Carbonic Acid Gas Company was 75,000 cylinders; that of Brin's Oxygen Company, 100,000 cylinders.

Ready Tests for Bricks.

In summing up the qualities that go to the making of a good building brick, the *Builder* states that there is but little to fear as to their behaviour under the chemical action of the atmosphere; as bricks, unless obviously very inferior, are not materially affected by the solvent power of rain water or the acids which it holds in solution. There should not be more cracks or small fissures in a brick than can possibly be helped; and bricks in which the cracks radiate from certain points should be rejected, as the expansion of ice within, during frosty weather, tends to split them in all directions. In order to test whether a brick is well burnt, it should be broken in halves, and the appearance of the fractured parts noticed. These should be of practically uniform colour from the centre to the outside. Though a sound brick can often be judged by its characteristically metallic ring, this is not an infallible test in glazed bricks with an extremely hard metallic-looking surface and soft inside. It is always easier to ascertain the quality of a brick by breaking it in pieces and regarding the fragments, than by any other rough-and-ready test. In this way, not only can thoroughness of burning be observed, but also some idea of the strength of the brick can be obtained. A brick required to be durable should not contain any white patches, nor show small stones or rough particles. By rubbing two bricks together, a great deal may be learnt as to how far the component particles have became agglutinated in the burning; but, in so examining bricks, care should be taken to first remove any sandy material that may be adherent to the surface, which may be due to the moulding. Perhaps the most severe test to which a brick can be subjected is to make it red hot, and then drop it into a bucket of water. If it survives this ordeal, there cannot be much the matter with it.

Determination of Thiophene in Benzene.—M. Denigès places in a 60 gramme flask 20 c.c. of his mercuric reagent, 50 grammes of HgO, 200 c.c. of SO_4H_2, 1 litre of water, and adds 2 c.c. of benzene. He stoppers the flask, keeps the cork in its position by means of a wire, and heats in a boiling water-bath for a quarter of an hour, agitating frequently so as to emulsify the benzene with the reagent. At the end of this time, it is allowed to cool, and is filtered through a tared filter, washed with boiling water, and dried at 110° to 115° C. until the weight is constant, and then weighed. The increase in the weight of the filter multiplied by $84 \div 1105 = 0{\cdot}0758$ shows the quantity of thiophene contained in the 2 c.c. of benzene.

Proposed Water Trust for West Kent.—We learn that a scheme is in course of preparation whereby the Kent County Council, the Sevenoaks Rural District Council, the Beckenham Urban Council, and the Bromley Urban and Rural District Councils will next year combine for the promotion in Parliament of a Bill for the purpose of forming a Water Trust for West Kent. It may be mentioned that the Kent Water Company are in a different position from the Lambeth and Vauxhall and the other Companies whose properties the London County Council are seeking to acquire, inasmuch as that Company do not draw any water from the River Thames, but from the chalk; and the feeling of the various Local Authorities is that on this account Parliament will not deal with the Company as with the others "What the ground Local Authorities may have for their surmises in this connection," writes a correspondent, "is not at all clear; but, judging from the unanimity of acquiescence associated with this view, it would appear as if there were some undercurrents in motion of which the general public are not as yet aware. One thing, however, is most certain, and that is that the whole of the county and local bodies in Kent are firmly determined to fight the London County Council to the last bridge."

TECHNICAL RECORD.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

The Half-Yearly Meeting of this Association was held last Tuesday, at Winchester, under the presidency of Mr. F. G. Dexter, the Engineer and Manager of the Winchester Gas and Water Company. The attendance of members was not quite up to the average, owing mainly to several Board meetings falling on the same day. Before the business commenced, the visitors were provided with luncheon, by the generosity of the Directors and the President, at a neighbouring hotel.

On assembling in the Board-room at the offices,

The President introduced to the members four of his Directors—Messrs. Birch, Drew, Brown, and Warner—who, he said, were present to support him, and to welcome the members.

Mr. F. C. Birch said he had to apologize for the absence of the Chairman of the Company (Mr. Barrow Simonds), who had written to express his regret that he could not possibly attend, and who, had he been present, would have given the Association a most hearty welcome, as he (Mr. Birch) had now the pleasure of doing. The Directors, he was sure, were proud that the members had elected Mr. Dexter to be their President for the year. With regard to the works, they had made, under Mr. Dexter's advice, many improvements. The gas-works were extremely confined; but the plant that had been renewed was very good, while other portions were works of antiquity. They found great difficulty in fitting the new plant into the place of the old, owing to the limited space; and consequently they could not put in such apparatus as they otherwise would do. At their water-works would be seen some good plant; and the water they pumped was of excellent quality.

The President said it was his duty to move a hearty vote of thanks to the Directors for their kindness in being present to welcome the Association, and for the use of the Board-room for the meeting. He thought he might say that the primary object of the members in associating together was to advance themselves in their profession. To do so, they met from time to time at various works, in order to obtain all the information possible. It was a great assistance to every member of an Association of this character to know that, in times of difficulty, he could turn not simply to what he might call the fertile condition of his own brain, but that he had at his disposal the experience of all the members of the Association. Consequently, although perhaps the desire among them was to further their own interests, there was no doubt that, in a secondary manner, those interests were brought to act upon the works of which they had charge, and in this way the companies benefited by the improvements the managers were able to introduce through the intercourse they had with one another. Therefore the Directors, he felt, were one with them in holding meetings of this character.

Mr. H. Sainsbury (Trowbridge) seconded the motion, which was cordially adopted.

Mr. Drew, in responding for the Directors, remarked that the members might look upon the Company's works as *multum in parvo*. They had a great deal of work to do upon a small space of ground. Soon after Mr. Dexter came to Winchester, upon his advice, they tried to obtain a new site near the Didcot line; but the matter fell through. The land was in the hands of the Ecclesiastical Commissioners, who thought that gas-works would injure the neighbouring land, and so depreciate the value of the surrounding property. The Company were therefore driven in a corner; but their able Manager was turning out as large an amount of gas as it was possible for any works to produce on so small an area of land.

The Honorary Secretary and Treasurer (Mr. Norton H. Humphrys, of Salisbury) having read the notice convening the meeting, the minutes of the last meeting were taken as read.

Departed Members.

Mr. J. Lowe (Weymouth) said it had fallen to him to propose a resolution relating to the removal from their midst of a very old friend of the Association and of the gas industry generally. He referred to the lamented death of Mr. George Garnett, of Ryde, who was President of the Association on two occasions, and a Past-President of The Gas Institute. From their long personal contact with him, and many experiences of his hospitality and great ability, it was a matter of deep regret to all that he was no longer with them. His memory would be very present to many of them for years to come—not only to members of the gas profession, but to numerous others. His genial disposition and his large-hearted kindness were, he might say, by-words with them. It was his (Mr. Lowe's) privilege to be associated with Mr. Garnett in the work of The Gas Institute during a time of great difficulty; and he thought they should all be proud of the ability which he displayed in piloting the Institute through a most difficult time, and that very successfully. That it was not more successful in healing the breach, he (Mr. Lowe) was in a position to say was not the fault of Mr. Garnett. No gentleman in the gas profession laboured more arduously to bring about the healing of that unfortunate division. In relation to their own Association, as he had said, Mr. Garnett was President on two occasions; and the first time was rather early in their history. Then District Associations were looked upon somewhat as an experiment. Mr. Garnett came to the rescue, and gave them a good start; and he believed he was the first who brought the directors of their respective companies in connection with the Association—a practice which he (the speaker) was pleased to see continued to that day by the presence of four of the Directors of the Winchester Gas and Water Company. It was felt in those days by many directors that it was a source of amusement for gas managers to meet together from time to time; but, through the instrumentality of their departed friend, directors were brought among them, and were shown that the interests of gas companies and their managers were identical, and that, by the latter meeting together, great good accrued to both. It was his privilege to reckon Mr. Garnett among his personal friends, and to be acquainted with him for more than a quarter of a century; and he had many opportunities of seeing the good work he was doing in the town in which he resided. As Chairman of the School Board of Ryde, he was always to the fore in the matter of education; and that town could boast of one of the best managed public schools in the kingdom. The resolution he had to propose was—"That this meeting desires to express a feeling of sincere regret at the decease of the late Mr. George Garnett, and to record the great esteem and respect entertained for him as a Past-President and a member of the Association; also to convey a vote of sympathy and condolence to his sorrowing relatives."

Mr. Sainsbury, in seconding the motion, said he had met Mr. Garnett many times at the meetings of the Association; and he was sure they had lost one who was a leader among them.

The resolution was passed by the members silently rising.

Mr. S. W. Durkin (Southampton) said it had fallen to his lot to refer to another loss the Association had sustained since the members last met. He alluded to the death of Mr. Thomas Giles, of Bridport. He became acquainted with Mr. Giles when he was at Cowes; and he should never forget the friendly feeling that always existed between them. He was of a rather retiring disposition; but he was a constant attendant at their Association meetings. He had to move—"That this meeting desires to express a feeling of sincere regret at the decease of the late Mr. Thomas Giles, and to record the great esteem and respect entertained for him as a member of this Association; also to convey a vote of sympathy and condolence to his sorrowing relatives."

Mr. Humphrys, in seconding the motion, observed that Mr. Giles was one of the first members of the Association; and although, as Mr. Durkin had said, he was somewhat retiring and hesitated to speak in public, he was a continual and warm supporter of the Association. He was also one of the earliest members of The Gas Institute; having joined it, he (Mr. Humphrys) believed, a year after it was formed.

This resolution was also carried by the members rising.

The Autumn Meeting.

It was resolved, on the motion of Mr. H. C. Shepherd (Old Swindon), seconded by Mr. Lowe, that the next meeting should be held at Torquay.

New Member.

Mr. W. A. Brown, of the St. Ives Gas-Works, was elected a member of the Association.

The President then proceeded to read the following

INAUGURAL ADDRESS.

The honour of the call to the presidential chair at your hands has been accepted from the firm conviction that every member is called upon to do his best for the Association, whatever may be that degree of assistance, as some acknowledgment—it cannot be called return—of the benefits he derives from the accumulated experience of, and intercourse with, his fellow-members, and not that I feel individually worthy of the distinction or capable of maintaining the prestige of past Presidents.

Upon occasions such as the present, when some relief from the pressing demands of winter supply permit us to spare a few hours in friendly intercourse at one or another of the works within our district, it is always well to look carefully around, and not merely note the methods adopted and results obtained at the works visited, from motives of curiosity alone, but compare fairly, and with an unbiassed mind, those methods and results with home doings, and see if some improvement cannot be effected, however trivial. Small things are apt to be despised, or thought to be hardly worth the necessary time to carry into effect; and yet with a moment's reflection how many great results have their origin in apparent trifles?

Many learned men have won their way to the front rank from a boyhood of insignificance and poverty. Why is this? The common reason given is conveyed in the one word "Genius;" but this is fallacious. To genius the after-effects may, in great measure, owe their brilliancy; but all is dependent upon the development of this gift. Development again results from practice; and practice is the utilization to the full of all those innumerable opportunities, small as well as great, that present themselves to us in daily life.

The opportunity of addressing you that I have the privilege of enjoying to-day is to be used principally in considering a few

points of interest connected with every-day routine—some of the mistakes (and difficulties that have arisen therefrom) that have been met with in my career and the considerations that influenced me in correcting them.

It has occurred to me that a great want of appreciation of the fundamental use of the retort-bench is too often shown. Old designs and notions are blindly copied year after year, without one intelligent thought as to the suitableness of the practice followed. Apart from the provision of necessary solidity, the main object is simply to pass the heat from the furnace through the retorts to the coal, to effect its destructive distillation with the least possible loss. This means the absorption of a definite amount of heat for each class of coal; and every pound of fuel burnt beyond what is necessary for this purpose is absolute waste. We can only effect this transfer of heat in practice, however, by arrangements which entail, and are inseparable from, a certain loss of heat. With a bench raised to the working temperature (say) 2000° Fahr., our ideal conditions would be simply to make good the loss at the retorts due to transfer to the coal alone. But we are hampered, in addition, with the loss arising from incomplete combustion, governed by the arrangements of draught, the loss from the high temperature of escaping products of combustion, of faulty flues and chimneys, and of radiation. In recent years, much has been done in modern works to minimize these evils. Incomplete combustion has been met with the generator furnace; the waste to the chimney has been largely counteracted by the regenerator; but in some of the smaller works (probably the least able to bear loss), not only are such improvements denied, but greater waste is recklessly indulged in. Instances have come under my notice where main flues and chimneys have been allowed to fall into the most dilapidated condition; and the work has not only been of a slovenly character, but has been made up of any odd material that happened to be available.

In the construction of flues, good fire-bricks alone should be used, as being the best non-conductors of heat, and to avoid risk of cracks or fusion; but it is sufficient if the chimney is lined only with fire-brick. Thin and careful joints in the whole of the work is necessary; and periodical inspection of the flues is desirable—all cracks being carefully filled with good fire-clay cement. By the use of inferior and unsuitable material, cracks and flaws will be much more numerous; and although many of them may appear insignificant, their number makes an aggregate area which, under the pull of the chimney, allows a very large quantity of cold air to enter. The draught of the furnaces depends upon the temperature of the products of combustion in the flues and chimneys; and every degree that this is uselessly lowered, either by conduction of heat or the admittance of cold air, simply means more fuel burnt in the furnaces to make up the loss (if their capacity allows of it), or otherwise—the draught remaining impaired, lowering of the heats result. Attention to this is all the more necessary where there is any length of main flue, as in cases where one chimney is used to several beds, and more particularly still if the products from the whole of the beds pass to one chimney. One of the principal reasons for the favour in which the practice of employing a separate chimney to each bed is held lies in the fact that this loss both from conduction and admission of air is avoided; so that though, on the one hand, the products would induce less draught in the lower single chimneys, the deficiency is partially compensated for by their higher temperature. With proper periodic attention, the loss by the admission of air need never take place, and that by conduction can be minimized.

Under these conditions, little could be said in favour of single chimneys to each stack on the simple question of draught, were it not that, where adopted, they have been found to lend themselves much more readily to working with different degrees of draught to suit the required conditions of different beds. At first sight, the reason for this may not be apparent, considering that whichever system be adopted dampers are provided at the exit from each bed to control and render the draught independent of the others. The evil lies beyond this, however, in the common practice of allowing the currents from the various settings to pass at right angles into a main flue common to all, without adopting baffle-plates or shields, to prevent the current from any one setting coming in direct collision with the cross current of the main flue. Given a definite chimney draught, the bed nearest the chimney has the best of the conditions with an unobstructed run; the next bed has to contend with the cross current from the first, which necessarily tends to block the way; the third bed is hampered with two cross currents; and so on—the last bed being the worst off in this respect, besides its length of flue-run hampering it still further. It is simply a question of two forces acting at right angles, and producing a resultant approaching more or less in direction and force that of the greater. Consequently the weaker current is interfered with in proportion; and if the difference be very great, the hotter and stronger current baffles the weaker as effectually as a damper, and is capable of rendering a bed almost unworkable. In all cases where currents meet, either from opposite points or at any angle, shield plates should be built in, so as to turn all the currents in one common direction before being allowed to mix. Similarly, if main flue currents approach from opposite directions to a chimney common to both, a division-plate should be inserted at the base; otherwise each current will seriously affect the other, unless they both happen to be equal in weight and velocity, when they would collide at the centre of the base, and pass up the shaft together, just as if an immovable partition had separated them. But this state of things is unlikely to occur accidentally, and can never be ensured. Bearing in mind the important principle of *avoiding collision*, any other case than here illustrated can readily be arranged for.

I will give you an instance of useless expenditure from want of observance of these simple facts. A single shaft was in use for a certain number of beds, and placed at one end. Subsequently other beds were added, and placed upon the opposite side of the chimney. The current from the main flue met from opposite directions at the common base of the chimney. Whenever both sections were going, the heats fell off. The stack was of ample capacity for all; but, instead of the simple expedient of a division-plate at the base being resorted to, the works were saddled with the expense of a pair of shorter chimneys for the new benches. These chimneys were connected to double main flues by one common base, with the result again that, whenever some of the benches only were needed, a down-draught would set in from one or the other of the pair, and seriously interfere with the pull.

All that has been said in relation to flues applies with equal force to chimneys. The draught induced by them depends on the reduced weight of the internal column of products of combustion, compared with the weight of a similar column of external air; and as this reduction in weight depends on the temperature of the products, nothing must be allowed in its construction to interfere with this—such as using any material other than a good non-conductor for the interior lining, or allowing any arrangement of air-channels in the brickwork, with the idea of keeping the brickwork from cracking. It may seem almost incredible to those unaccustomed to pay attention to these points that the difference between bad and good practices in flue and chimney construction is capable of amounting to 50 per cent. on the fuel account.

In some cases even iron chimneys are made use of; but, from the foregoing, perhaps the true value of these will be appreciated, though the following illustration may be useful in confirmation: In working the old type Siemens gas-producer, an iron tube is made use of as an outlet for the gases which rises to the height of 14 feet, passes horizontally, and then descends to about the former level—the total surface of the tube being 60 square feet per producer, gasifying about 2 tons of coal per twenty-four hours. This is done with the object of cooling the gases, and very well it does its work—lowering the temperature from 1100° Fahr. at the intake to 100° Fahr. at the exit. The mere substitution of common red brick for fire-brick will lower the draught of a chimney one-third, while stonework will lower the pull two-thirds.

Has the influence of radiation as affecting the fuel account received all the attention it deserves? A bench as commonly built has the greatest thickness of wall where least needed; and the thinnest where most wanted. Thus the side walls, though protected by the adjacent beds, are frequently 18 inches; and the arch is built of three rings of fire-brick, besides further protection with several courses of common bricks, or a depth of rubble. Contrast this provision for the retention of heat with the front and back walls of 9 inches only. It is not advocated by this that the division-walls and arches of stacks are built too thick, but simply that the front and back of the stack, being so much more exposed, should receive at least as much protection—not less. It is true the back sometimes comes in for more attention; but the front is often neglected. Take the case of an ordinary double-wall producer, with the intervening space packed with a non-conductor. All this precaution is taken solely to retain the heat, though the working temperature is considerably below ordinary coke-fired retort-settings. The front walls radiate strongly, apart from loss by conduction with the ever-circulating currents of air, and are the principal factor in producing the almost unbearable temperature of some retort-houses, to reduce which all manner of expedients are resorted to to induce a strong current of air through the building. But it is manifestly more rational to take steps to prevent this loss, instead of allowing it to go on continually, and merely adopt means to lessen its uncomfortable effects.

In the number and thickness of interior walls, opinions and practice again differ. A glance at their use will perhaps indicate the proper course. They are needed (1) As supports for the retorts; (2) to effect an efficient circulation of the flame and products of combustion throughout the setting. For the first purpose, it is not enough to "just support" the retorts, and trust to the cohesion of the material to keep them in shape and place. Fire-clay not being a material at all suited to this treatment, the retorts bulge and crack; and the rapid collapse of the whole setting follows at about half to two-thirds of its proper life. This wasteful practice is usually the outcome of mistaken economy in the fuel account; but the objection of increased fuel due to thicker walls will not bear investigation. Taking, as typical cases, similar stacks of eight 16-inch round retorts, containing, in the one case, five interior walls, 4½ inches thick, and in the other, five walls, 9 inches thick, we have an approximate difference in weight of material of 2½ tons, allowing for the space occupied by the retort sections. The specific heat of fire-clay is 0·21; and assuming our temperature to be 2000° Fahr., it will take 2 cwt. of coke to raise this extra thickness of wall to the temperature of the setting. This is the only expenditure of fuel for this

purpose; but, of course, it would be repeated each time that the setting had to be let down.

Of all the difficulties in working that at one time or another are experienced in different works, I do not think that anything exceeds the loss and anxiety caused by stopped ascension-pipes. In effect, it is equivalent to higher prices for coal, increase in labour, and increase in plant; while the plant that remains workable cannot be maintained at its maximum efficiency. Whenever this evil is experienced, every effort should be made to remove it at once. It will not do to resignedly accept the conditions, with perhaps some feeling of pity for the poor fellows whose hard and exceedingly harmful duty it is to unstop, or to spend time in attempting the concoction of some fanciful theory to excuse it continuance. To the extraordinary number of apparently contradictory statements and ideas that have grown around this question, the mystery associated with it by many is undoubtedly due. This experience never presented itself during my early training. The conditions of working then were 22 in. by 16 in. oval ⌂'s worked at high heats, with Yorkshire coals, 6-inch ascensions, and hydraulic with anti-dips. Upon taking my present appointment, however, I was enabled to add this experience: The plant arrangements were 16-inch round retorts, worked at moderate heats; 5 in. by 4 in. and 4 in. by 3 in. taper ascensions; small cast-iron ⊍ hydraulic, 1 ft. 6 in. by 1 ft. 3 in.; and ordinary dips and bridge-valves. The coals used were Durham. The number of stoppages and frequency of repetition would vary—sometimes with the wind; or, if no wind was available, causes were discovered that I will not waste your time in enumerating.

At the time of which I write, the greater part of the well-known makeshifts had been tried to obtain relief. Among them may be mentioned: (1) Arranging a water supply at the top of the ascension to trickle down the interior. (2) Placing inside the retort, immediately under the bottom of the ascension-pipe, either a bowl of water, rag or waste soaked in oil, pieces of solid grease, or small coal soaked in water. (3) Keeping doors and every available aperture wide open. (4) Bringing a special supply of cold air from outside to the front of the bench by means of pipes. (5) Keeping the retorts charged to their utmost capacity. (6) Lowering the heats.

I think it will be conceded that the one common ultimate effect of all these expedients resolves itself into lowering the temperature of the ascension-pipes, although, when oil or grease is used, possibly some solvent action may be added. The effect of the last expedient represents not merely easing the ascensions, but also the hydraulic. It may at once be said that not one of these notions proved of the slightest practical benefit. The last, lowering the heats (and, of course, the charge) would be the most sure, but at the same time the most untenable and indefensible practice. Freedom from stoppage at the cost of manufacture is paid for far too dearly. Easement would be obtained for a day or so, and then would come the relapse in all its intensity. To whatever notion happened to be in favour just then would, of course, belong the credit of the short-lived relief; but it appeared to me that these apparently extraordinary fluctuations had a very simple explanation. The accumulation of stoppages—sometimes amounting to 30 per cent. of the total retorts under fire—necessitated continuous heating of probes and rods to get a way through the pipes. The continuous rush of cold air through the setting of each furnace used for this purpose, and the admission of cold air to the main flues, checking the draughts, led to a reduction of heat all round. Less work being then possible, simply eased the work done both by ascensions and hydraulic; and this work, brought within the limits of capacity of the plant, prevented any further choking until the heats and the make again increased.

This consideration led me to trace the history of the plant. I found that the benches and hydraulics were originally intended and used as settings of fives, but had been added to until eight retorts were worked within the same arch, and with the same mountings. In the days of fives, stoppages were practically unknown. This strong confirmation convinced me that a cure was only to be obtained by an increase in the capacity of the plant in proportion to the work then done. Before the opportunity occurred to do this, however, it was determined that the hydraulics should be cleaned out, and a well-known patent differential tar and liquor overflow apparatus fixed therein. This was effected for one section in June, and for the second section in September. Before long we had indications that the overflows would not remain free; and men were sent up with rods twice daily to clear a way through, but all to no purpose. By September the section put in in June was completely choked up, from one end of the hydraulic to the other. On removing the cover-plate, it was found that the gritty matter had worked up through the sieves, and deposited upon the top, filling up the entire gas space flush with the underside of the top plate. At the end of November, the section put in in September failed in precisely the same way. I had calculated that our loss of gas from stoppages of ascension-pipes amounted to 1000 cubic feet per ton of coal carbonized; while the extra staff for pipe cleaning frequently equalled the regular gang. But here we had a dead stoppage of one-third of the available plant well into the winter. You will understand the anxiety this occasioned, and the loss it represented.

The following spring saw no more of the old plant. The opportunity occurred; and I had the whole of the old plant pulled down, and hydraulics in sections, measuring 2 ft. 4 in. by 1 ft. 8 in. substituted, with 6-inch ascensions, bridges, and dips. Irving valves were fixed at the centre of the back of each section, by which the tar is removed from the bottom of the hydraulic; and, in addition, a flush-out can be obtained at any time. When flushing, the gas-way is closed, and a direct through way from the bottom of the hydraulic to the 4-inch tar-main obtained, by one operation. The pressure of the accumulating gas tends to drive the tar out, in addition to the assistance obtained by the direct fall to the well. The valve being reversed, the hydraulic would be again charged with water or liquor to seal. My own arrangements supplement this by the addition of separate flushing outlet tar-pipes from the bottom at each end of the hydraulic, and the addition of an egg-ended boiler, mounted 4 feet above. This boiler is fitted with an air-valve at the top, and is charged with liquor. Direct from it are arranged two 2-inch deliveries to the top of each hydraulic. After running out the tar, these liquor deliveries are turned on, and the double 2-inch flush obtained. After a couple of charges, the hydraulic is permitted to work a week; and then the process is repeated. This system commenced in 1892; and of it I cannot speak too highly. It put an absolute stop to our difficulties, and paid its cost in a few months only. The sections have been often examined; no form of deposit ever occurs, and they have always been found as free as when fixed.

Before passing from the region of the retort-house, I would strongly impress upon my hearers the great advantage derived by the use of small weighing-machines, over which the whole of the coal for carbonizing can be weighed. Words of warning have been issued to watch well the water-line of the station-meter. In other cases, complete dependence having been placed upon the unvarying quality of coal, or upon the maintenance of a certain standard of working results, an allowance of coal has been made at the close of a half year altogether inadequate to balance the actual use. If from inability to accurately gauge the contents of the store at the close of a half year, figures have been assumed under these conditions, it becomes a very disquieting and undignified matter to face the necessity of writing down deficits at the close of twelve months' working. These possibilities led me to place such machines at the outlet of our stores. The machines are balanced to the required weight for a barrow load, and, with practice, the men gauge, with commendable accuracy, the quantity required. When placed on the bridge, a little coal put on or off with the shovel adjusts the weight; but it is frequently unnecessary to do this. The number of barrows wheeled in under each day and night shift gives me a complete check. The quantities for each shift and for each of the two retort-houses are kept distinct. This gives the relative work of the two gangs in make per ton per retort or per bench; and any deficiency in yield, weight of charge, heat, or fault at the station-meter can be instantly detected and corrected. The ease with which trial-runs with strange coals can be conducted is a strong recommendation also.

The unsatisfactory nature of atmospheric condensation, whether effected by the plain tube or annular patterns of condensers during extremes of temperature, led to the adoption here of the water-tube variety. My experience in this direction prompts me to recommend to those contemplating a similar move not to dispense with the ordinary condenser altogether, especially if they can receive some protection; but to effect condensation as far as possible in these, and simply utilize the great facility of control with the water-tube form to finish with. In some cases a long run of foul main might ease the work sufficiently; but with us the water condenser having to be placed rather close to one section of hydraulic, it has proved difficult, when this is in use, to effect efficient condensation without (from my dual points of view of Water-Works Manager) a great waste of water. The outlet water from our condenser is returned through the works, and made to supply the boilers, urinals, and all tanks, from which water is used for quenching coke; but a large surplus remains to be run off.

In connection with the subject of purification, you may remember that I have advocated for some time past the advantage of the use of exhaust steam to prevent the hardening of the oxide of iron when revivified *in situ* by the air process. At the meeting of The Gas Institute last June, I had the honour of submitting a second paper dealing with the subject. Our plant for ammonia purification had not up till then been properly proportioned to our manufacture; and it was suggested to me, in the subsequent discussion, that rectification of this fault would remove the cause of hardening. My case then was that our difficulties with caking arose from the heating and drying of the oxide, and that the presence of ammonia had not influenced the matter. Since that date, our new scrubbing plant (considerably in excess of our present requirements) has been in constant work; and I have purposely discontinued the use of the steam to determine the true influence. My experience completely confirms the previous contention. Every single purifier has since been shut down from back-pressure, due to caking alone—the material not being properly spent on any one occasion, and the period of service being greatly reduced. It is hardly necessary to state that, having completed the varying conditions of twelve months' working, in order to displace the condition of opinions by one of fact, we are now returning to its use.

Although perhaps you may consider that the conditions of public lighting here do not permit me to speak from extended experience, I would ask you to note that experience is not wanting; but it is unfortunately of the very opposite character to your own. Do not assume that because the service of public lamps entails a considerable amount of extra trouble, and that when the usual values have been taken into consideration, and a very slight balance is shown in favour of the Company, it at all admits of the argument that the business might almost as well be done without. You are not dealing with a question that can be expressed in so much £ *s. d.* alone, but with one that I am confident seriously affects the revenue through its influence upon the estimation of the public. There are always consumers to be found who find in the absence of public lighting, strong confirmation of the reality of their own grievances. Handicapped with a set of miserably small leaky fittings, burners developing one-half of the illuminating value of the gas only at their best, but further reduced to a duty of one-third, or perhaps one-fourth only, and then not even possessing the recommendation of steadiness through the use of small-bottomed shades, is it to be wondered that the prejudice of these people is greatly strengthened, and gives birth to the thought that what is found best for the streets should be best for them? A change is made without the semblance of a thought that relief might be obtained by communicating with the gas company. Their lamps yielding a strong and steady, if not brilliant light, are found to compare most favourably in cost with their past experience of gas lighting at what was to them the equivalent rate of about half-a-guinea per 1000 cubic feet. The consumer so lost has to be reckoned with not solely in the light of the immediate reduced rental, but as a powerful factor continually influencing others to profit by his experience. The non-consumer prejudiced against gas lighting, although having never tried it, is bad enough; but the experienced man who has burnt gas, but finds oil much cheaper and better, is infinitely worse. I have had repeated instances of new comers to the city prejudiced against the Gas Company at the very outset by what appears to them the extraordinary necessity for oil in the streets. Some cases have also come under my notice where would-be residents have gone elsewhere confident that, if the ancient city of Winchester can be so true to its traditions as to continue this form of public lighting, in all probability the sanitary measures, the conveniences, and enterprise generally, would be found upon a similar level. The city remains the poorer in the one instance; but the Gas Company suffer in both.

I am well aware that my remarks upon this subject will, to a certain extent, apply with equal force where gas lighting for the streets is the rule, and not the exception; but I want to impress upon you that it is a fatal mistake, in the interests of a gas company, to permit the introduction into the streets of any system of lighting inferior to its own, if it can possibly be avoided. The greatest possible safeguard to the company's interest is undoubtedly to keep in constant touch with the other end of the pipes. Continuous attention is given, and rightly too, to the avoidance of all waste, the attainment of the greatest degree of efficiency in the works, the distribution department, and at the consumers' meters. But, at this point, interest frequently slackens, or is even absent, and yet, with increasing competition, it is daily becoming of greater importance. I hope the day is not far distant when assistance to, and the satisfaction of, the consumer will rank with considerations of the first character in the conduct of every works in the country. There are bright examples of this essential policy here and there. But only when the practice becomes general, will the consumer learn the true value of gas, and, if not bent upon securing the company's assistance upon every occasion, will at least refer to them for it whenever dissatisfied. I would prophesy under such conditions that fewer retorts would be found with them, and more with us.

We have recently offered additional inducements to the public to burn gas, by adopting the use of cooking-stoves and prepayment meters; and it is interesting to note the relative value of these agencies in increasing the revenue. Our first exhibition, made as attractive as possible, was held a year ago. We have now 42 cookers on hire. The average cost has been £4 16s.; and the average consumption per cooker, 18,500 cubic feet per annum. On the other hand, two prepayment meters only were put in last June; and without any advertising we have now increased to 30. The cost has averaged £2 17s., whereas the average consumption has been 30,500 cubic feet. I cannot help thinking that the comparison is greatly in favour of the prepayment system, and indicates that further enterprise in this direction would be well repaid. My personal opinion is very much against the excessive charges in the form of additions to the price of the gas made in many districts to cover the cost of fittings or rent. It appears to me to be defeating the very object of their introduction. We are anxious to augment and stimulate consumption. But it clearly follows that the higher the rates charged as rental for fittings, &c., the greater the interest of the consumer to curtail the consumption to the lowest possible limit; and the consumer must necessarily find the cost compare unfavourably with other illuminants under such conditions. Is it not better policy to keep these charges as low as possible? The greater the consumption, the less the ratio for fittings can be made. When a consumption is assumed as a basis to determine the percentage to be added, it appears to me that the consumer exceeding this should either have the excess payment returned, the sum credited in permanent liquidation of the cost of the fittings, or compensation allowed by increasing the number of cubic feet allowed per coin; and not compel them, as is often the case, to pay a premium of continually increasing ratio, in proportion as their increase in consumption fulfils the wishes of the company.

Another objectionable feature recently introduced is the attempt to bind the consumer, by agreement, to pay upon the ordinary index registration when the prepayment mechanism fails. With such a practice, where is the safeguard of the prepayment to the consumer? The very essence of the popularity lies in the relief from overhanging charges in the form of the quarterly bill, the uncertainty as to what has been burnt, and what to put by to meet the charge. If the company, having the sole choice of the class of meter used, profess to supply an article worthy of a reasonable degree of confidence, and charge rent for so doing, there is no justification for attempting to saddle the consumer with the inconvenience resulting from a breakdown. Frequent inspection, inseparable from the prepayment system, should prevent all but trivial loss, as there is no difficulty in checking the forward index with amounts received each time the coins are removed.

Perhaps no subject connected with the gas industry has received more attention recently than that of augmenting, either in quality or quantity, the ordinary process of destructive distillation. The general use of generator and regenerative furnaces has led (by the higher heats attainable) to the gas-yielding capabilities of our coals being taxed to the utmost—at least, as far as the process we remain wedded to permits; and the demand for more light or more gas, according to the circumstances of the case, has led to the introduction of oils and spirits into our service to augment the illuminating standard, either by gasification in retort plant as a permanent help, or by vaporizing with the assistance of steam to tide over temporary depressions in quality. For augmentation of yield, it is remarkable we have turned again to a bye-product once rejected as no longer of value for gas manufacture—our coke. By the process well known to you as water gas, with the assistance again of oils, has been utilized what had till then been ignored—a very heavy percentage of the total gas-making value of the coal.

Satisfactory as this advance undoubtedly is, there is still a flaw. We do not realize and render available the store of gas-making material locked up in the hundredweight of the bye-product tar. What is there here? We are told, upon the authority of Mr. Bell, in an interesting pamphlet upon the Peebles process, that a ton of Durham tar represents 15,000 cubic feet of 25-candle gas and 15 cwt. of good coke, which is roughly for gas-making purposes the value of 2 tons of Durham coal. We have also analyses showing that this odd hundredweight contains 37 per cent. of oils suitable for gas making and enriching purposes, and about 60 per cent. of carbon as pitch capable again of conversion to the gaseous form by the adaptation of water-gas plant. Praiseworthy efforts to utilize this value have repeatedly been made. Although the difficulties surrounding past experiences have prevented the subject receiving much support and interest, it is useless to shut our eyes to the fact that the value exists; and the fact that it is not utilized constitutes a blemish upon our professional capacity. It appears to me that the position of the matter is this: We have been content since the introduction of gas lighting to distil coal in closed externally-heated retorts, and find a market for the residual fixed carbon or coke, and a certain percentage of hydrocarbon matter that escapes gasification as tar. Experience taught us that our primary object—gas manufacture—was better fulfilled by high heats and clay retorts, instead of low heats and iron retorts; the yield of gas increasing as the percentage loss in the production of tar was reduced. Recent research and experiment have advanced us to open recognition of the value of one of the former bye-products—the fixed carbon or coke—to produce, not an illuminating gas, but a combustible gas, capable of being used as a base, and, with the aid of carburetting, rendered fit for service to the consumer intermixed with (what one may term) the earlier product coal gas. Our efforts have likewise been directed, though with somewhat less success, to utilize the other bye-product—tar—for a similar purpose.

Now, this being the case, and our bye-products raised to the rank of active utilization for direct gas manufacture, is it not worth considering whether, instead of the present piecemeal triple system of working, the future may not have in store for us still greater economy by the direct manufacture of a combination coal-water-gas made from one plant, and carburetted further or not as experience may dictate. Apart from the question of greater yield (and I think there is some chance of this by the opportunity of working in the tar), there can be doubt that the single form of water-gas plant would be far less costly, and occupy much less room, than would be necessary to place an identical mixed class of gas into the holder by the present division of triple coal, water gas, and tar plants. It has occurred to me also whether it may not be worth while to experiment upon opposite lines—to distil the coal at very low temperatures intentionally for oils; convert the coke into water gas; and carburet with the addition of the coal gas first obtained, and by gasifying the oils.

There is no doubt that water gas will eventually play an important part with us in meeting the public need for an

ample supply of medium illuminating power, low in price. Success is not likely to attend attempts to lower existing standards, upon the assumption that consumers can or will meet their wishes by incandescent systems, or carburetting at the meter or the burner. The ordinary burner must, of necessity, be used in a large number of cases; and people are to be found who will not give a second thought to any system requiring the slightest attention beyond ignition. For these reasons, and that the richer gases cause greater trouble to satisfactorily consume, they are less suitable for fires and stoves, and cost more. We are much more likely to maintain our position, if not to improve it, by supplying, at the lowest possible cost, a gas well suited for heating, capable of holding its own with popular competitors when used with the ordinary burner, and available alike to adapt for incandescent systems, or further enrichment for those who prefer the trouble.

The gas world was electrified recently by interesting information concerning acetylene; but it is impossible to seriously entertain the suggestion that anything of this character is fitted to displace present practice. The growth in public favour of the convenience of one supply for all purposes is an all-important element of our success; and the disturbance of other uses for the sake of the one of lighting alone cannot be lightly considered. This confines its utility, when commercially available for carburetting, either at the works or the consumer's meter. There appears to be some uncertainty of its value in the former instance, through its high density causing stratification; and its use for the latter purpose must turn largely upon the combined influence of cost and convenience.

I am afraid, gentlemen, that to draw further upon hypothesis for subject-matter, will exhaust your patience. I have to thank you for your attention; and, in so doing, express the hope that the remarks it has been my privilege to make will not detract from the prestige our Association has enjoyed in the past.

Mr. Humphrys said he had pleasure in proposing a vote of thanks to the President for his address. He was sure that all the members, with the knowledge they had of their President's past career, and of the various papers he had read before The Gas Institute and other Associations, had formed very high expectations with regard to the nature of the address to which they would listen that day. Having heard the address, he thought he might say they were not at all disappointed. The subjects dealt with were well worthy their consideration, and were very appropriate for the times. He supposed there never was a period when it was more necessary to be on the look-out for everything that would improve their working in any possible way. With electricity and cheap oils in the field, gas managers were decidedly put on their metal; and it was to such addresses as they had listened to that day, that they must look for help in encountering the various competitive illuminating agents.

Mr. J. J. Jervis (New Swindon) seconded the motion, which was unanimously agreed to.

The President, in acknowledging this kind expression of approval, said he should like to call attention to two or three points in connection with the remarks in his address. He would refer the members to an interesting report, in the Journal of Gas Lighting for April 23, of the meeting of the Ohio Gas-light Association, at which a paper was read by Mr. W. S. Bowen, of Philadelphia, on "Soft-Coal Water Gas." This gentleman, it appeared, experimented last winter with an apparatus into which small charges of soft coal were fed, and caused to give off its gas. The resultant coke was converted into water gas, without being moved or handled. The mixed gases were enriched with vapours of oil, and were passed through a mass of incandescent coke, which converted the carbonic acid into carbonic oxide. The particulars which Mr. Bowen was able to give, and the working results generally, he (the President) thought deserved serious consideration. On the same occasion, another gentleman, in the course of a discussion on furnaces, called attention to the improved results he obtained by insulating the retort-beds, and introducing non-conducting materials between the walls, so as to conserve the heat, and stop radiation as far as possible. In connection with the subject of public lighting, as the members were aware, he had been experimenting, for some twelve months past, with twenty incandescent burners in the streets; and the work they had done had been very satisfactory. The Company, however, had not been successful in inducing the Corporation to accept the terms they offered. The price submitted by his Directors was 50s. per lamp per annum; taking over the maintenance and everything. Although the Corporation had not yet accepted the terms, the Company were in hope that they would do so, and so remove the standing disgrace to their ancient city. As no doubt the members were aware, some of the newly-constituted parish councils in different places were recognizing the necessity of improving their street lighting. One of the neighbouring parish councils—that of St. Faith, in the direction of the water-works—had accepted a tender from the Company to light with incandescent burners their district for a period of three years. Another matter connected with lighting, but which was not referred to in his address, was this: He had been asked on several occasions—generally in connection with fêtes—whether gas companies could not introduce some means of illuminating marquees and other places where temporary light was required. He wished to mention to the members the fact (which he did not know at the time the inquiries were made) that cylinders could be obtained from Brin's Oxygen Company filled with coal gas compressed to 120 atmospheres. A cylinder contained 60 cubic feet of coal gas, which would keep an incandescent burner going close upon 20 hours, if the consumption was regulated.

Mr. J. S. Ineson (Ventnor) then read the following paper:—

A FEW DIFFICULTIES IN CONNECTION WITH GAS-WORKS MANAGEMENT AT VENTNOR.

Having been requested by the Secretary of the Association to read a paper describing the difficulties encountered at Ventnor, and the means adopted in surmounting them, I at first thought that a paper on this subject could not be of much practical use to the members generally. Upon second consideration, however, I thought there might be a few points that would be useful; and, if not, that it might still be interesting to describe our unique position as a gas-works.

You will no doubt remember that, at the meeting held at Sherborne in 1885, the late Mr. George Garnett read a short paper on "Accidents to Gasholders in the Isle of Wight," wherein he described an accident which took place, owing to a landslip, on the first night of my arrival to take charge of the Ventnor Gas and Water Works. I will not enter upon any further description of that, but will describe a few accidents that have occurred since then, more especially a very serious and extensive landslip which happened in the early part of the past year.

All who are acquainted with the Undercliff in the Isle of Wight know that for miles it is one continuation of landslips. The position of the Ventnor Gas-Works is peculiar. They are situated on the sea shore, and stand on a piece of land extending prominently into the English Channel; and thus receive the full force of the Atlantic gales. Being so situated, it necessarily follows that they should be protected by sea-walls. The principal geological formation of the site is gault or blue clay, which, from its tendency to slip and slide, is locally called "blue slipper." This gault rests on the lower greensand, the stratum of which dips towards the sea. Water percolating between the two, causes the gault to slide forward. There are also faults in the gault itself, which are as smooth as a piece of glass, causing one portion to slip over the other. The land immediately behind the gas-works rises to an elevation of from 70 to 100 feet, and continues to rise to 750 feet within half a mile of the shore. The whole of the ground upon which Ventnor is built is broken up and dislocated from the causes which led to its formation; and movements of the ground are continually occurring. This will give you some idea of the dangerous position in which the works are situated.

When I first took charge of the works, they were protected by a sea-wall, from 10 to 15 feet in height. This wall was built nearly perpendicular, and not of very great strength; and during a storm, the sea struck the wall with such force as to cause the water to rise to a height of between 40 and 50 feet, completely covering the buildings and gasholders. To give you an idea of the force and power of the sea, I may say that I have seen a pile-driving monkey weighing 15 cwt., which was laid on the top of the sea-wall, moved several feet; and retort mouthpieces, standing about 12 feet from the top of the wall, have been washed overboard. The continual action of the sea striking the walls causes great destruction to them.

On Sunday, the 15th of November, 1891, at three o'clock in the morning, one of my stokers rung me up, and said that a large portion of the sea-wall had been washed away, and the land swept out to within 6 feet of the coal-store. On going down to the works, I found that between 20 and 30 feet of the wall had disappeared. Behind where it had stood was a pit about 12 feet deep, and the sea was breaking in furiously.

As it was impossible to commence building the wall in such a sea, I had to think of the best precaution to be taken to protect the coal-store, and prevent further inroads being made on the return of the tide. I immediately despatched a man to a farmer at the top of the Downs, with a request to cut two waggon-loads of furze bushes, and bring them down without delay. These were at once tied into bundles, and the pit filled up with them. This completely checked the force of the waves when the tide returned; and although the sea broke over the wall at each side of the breach, it fell quite harmlessly among the furze bushes. By this means, we saved the coal-store. (I might here say in parenthesis that, on the 1st of January, 1877, during a heavy storm, the sea burst through the wall, knocked down the end of the coal-store, and swept clean out to sea a large portion of the stock of coals). On the next tide, we commenced rebuilding the wall, and got a fair portion done before the tide returned; but all our labour was in vain, for the sea swept it clean away again. This continued each tide up to Tuesday morning, when, the sea having calmed down, we succeeded in getting the work to stand, and completed it by midnight on Wednesday.

The works are now nearly surrounded by a much more substantial wall; it being 10 feet thick at the bottom, and built with a good batter—the top being slightly curved over. It is built to a height of 17 feet, as shown by the drawing. The sea does not strike a wall of this description with such force as the old straight ones; and the curve at the top throws the water back again, so that we get very little now on to the works—merely the spray, and a small quantity of water blown over by

the force of the wind. I have already completed 600 feet, and about 84 feet remains to be carried out, which I hope to finish this year. This is one of the disadvantages of being situated so near the sea; and the repairs and maintenance of these sea-walls must necessarily be high.

I will now give you a short account of what occurred through landslips. At two o'clock one morning, the stoker called me up, and said there was a very serious escape of gas under the purifiers, and that the gasholders were empty. The morning being very dark, on going to the works we had to grope about to find where the escape was. After a little time we found it, and temporarily stopped it until daylight, when we could see to make a more permanent repair. This was the result of a movement of the land, and happened in midwinter. You will acknowledge that it was not a very pleasant outlook for supplying the town the following night. However, we managed to get over it without any grumbling as to short supply of gas.

I may here perhaps give a practical hint, which might be useful to the members some time. As it was impossible to give quantity, I tried quality. With each charge of coal put into the retorts, I mixed about 2 gallons of tar, which brought up the illuminating power, and enabled me to supply the gas at a much lower pressure. This is a rough-and-ready way of doing it; but it answered the purpose well.

Without mentioning other minor accidents which have occurred at one time or another, I will occupy your time only a few minutes in describing the landslip which occurred during the past year, and which has proved to be the most costly and difficult of any we have had. A large mass of land immediately to the westward and partly at the back of the gasholder to which the accident occurred in 1884, began to move and slip forward after the autumn rains of 1893. The movement was very slow and gradual, until after a fall of snow and heavy rains in January last year, when it began to move more rapidly. Several hundred tons of earth slipped forward towards the sea, cracking the gasholder tank considerably, and causing the water to leak out; and although we had water continually flowing in from the town main, we were unable to work the holder at more than two-thirds its capacity. In May, I completely emptied the tank, and lifted the gasholder out. I then found cracks into which one's arm could be thrust full length. These we at once repaired, filling in with brick and cement, and grouting. We then lowered the gasholder, and filled the tank; and it is now fairly tight, and likely to work for many years, for we have completely stopped the slip, and the position is much strengthened. On reference to the section, you will observe a dotted line A, showing the slope of the land before the slip occurred; and another dotted line B, showing the position of the land after the slip.

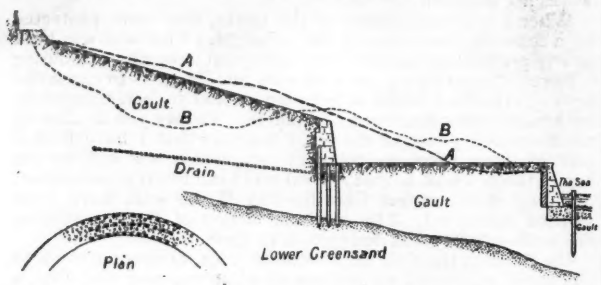


Diagram showing Slip of Land at the Ventnor Gas-Works.

The method we adopted for securing the land, and preventing further slips is as follows: After clearing out the land which had slipped forward, we commenced driving three rings of 10-inch piles (as shown on the plan and section), 3 feet centre to centre, these piles are 30 feet long, and were driven through the gault with a footing into the lower greensand. To give you an idea of the hardness of the clay, where it is not intermixed with water, we could only get the piles down about half-an-inch each blow, with a monkey weighing a ton, raised by steam. After the piles were driven, we cut them off at a convenient level; and the ground was excavated around the pile-heads to a depth of about 3 feet, and filled in with cement concrete to form a foundation for a retaining wall, which is built of stone in cement, 6 feet thick at the base, with a face batter of 1½ inches to the foot. The piles are driven and the wall built semicircular, to give it greater strength. A 6-inch drain-pipe was laid in the land, and the trench was filled in with burnt clay rubble to collect the water in the land. This is carried under the foundation of the wall, round to the front, and discharged into the sea. We have also driven a row of piles along the front of the sea-wall, to secure a better footing, and excavated as deep as the tides would allow—about 5 feet—and filled in with concrete, upon which is built the sea-wall.

The whole of the work is now completed, as shown on the section. By these means we hope to effectually prevent further slips; and we have also secured a piece of ground, on which to erect a gasholder, when required.

These troubles and trials have always been easy to bear, through having a Board of Directors composed of gentlemen who have never hesitated to spend money to render the works thoroughly strong and substantial.

Discussion.

The President said the paper was not only an interesting one, but was bristling with facts which might be useful in the future. He had had the privilege of visiting the Ventnor Gas-Works on two or three occasions during the progress of the work described. It was said that one derived a certain amount of consolation and pleasure in finding that one's friends met with difficulties, and had awkward matters to contend with, as well as oneself; and it was certainly consoling to him (the President) to find Mr. Ineson was placed in a similar, or perhaps a worse, position than himself (laughter).

Mr. Durkin asked if Mr. Ineson succeeded in getting the piles down through the gault.

Mr. Ineson: Yes; with the exception of one or two, which were driven by hand machine.

Mr. Durkin: I suppose you drove them with water.

Mr. Ineson: No; that would be impossible. We used steam power.

Mr. Durkin said he would not mention exactly where the place was; but there was a bed of gault in another part of the district. A concrete wall was built there; and it gave way. In conversation with one of the engineers, he asked why they did not provide a footing for the wall by putting down piles; and he replied that they could not get the piles into the gault. He congratulated Mr. Ineson in having overcome his difficulties, and concluded by asking if there was any likelihood of the greensand moving.

Mr. Ineson: No.

Mr. Sainsbury remarked that, when visiting the Isle of Wight last summer, and seeing the difficulties Mr. Ineson was in, he was thankful he was an inland gas manager. But sometimes they had difficulties inland that were not experienced at the seaside—for instance, frost and snow affected them to a greater extent inland. When he saw Mr. Ineson's position—with a landslip behind him, and the sea in front of him—he could not see how he would get out of it; and he went home to Trowbridge very pleased that he was not the Manager of the Ventnor Gas-Works.

Mr. Jervis had listened with pleasure to the explanation of the manner in which Mr. Ineson overcame his troublesome work; but had he been inland during the past winter, he would have had some experience with his gasholders equal in all respects to what he had described. In his (Mr. Jervis's) own case, the gasholder tank was affected by the freezing of the land; and he could not for several hours get the holder up or down. The frost played such havoc with the tank, and obstructed the free working of the holder, that it was canted 6 or 7 inches.

Mr. W. Higgs (Basingstoke) was pleased that papers of this character—describing the difficulties of the writers—were brought before the Association. He thought that very often a great deal more was to be learnt from their failures than from their successes. The way in which Mr. Ineson grappled with these by no means common difficulties would, he thought, put fresh heart into the members who lived inland; and when they had to encounter difficulties—though not on a par with those described in the paper—they would have more courage and perseverance to deal with them. With regard to Mr. Jervis's observations, he (Mr. Higgs) had also had some trouble with the brick tank of a small holder, which he used constantly as a medium by which he worked his larger holders. The tank became thrust in through the frost from without, which prevented the holder going down when it was full. As usually happened on such occasions, this occurred at midnight; and they had to chop away the brickwork to ease the holder, in order to allow it to work down.

Mr. Humphrys inquired of Mr. Ineson whether the wall he had referred to was built of concrete.

Mr. Ineson: Stone, in cement.

Mr. J. Robinson (Winchester), the County Surveyor, on the invitation of the President, remarked that the particular class of work described in the paper was somewhat outside his particular practice. The difficulties the author had had to contend with seemed to have been very great indeed; and he (Mr. Robinson) was not sure whether Mr. Ineson or his shareholders were to be most commiserated with. These continual expenses must, of course, add very greatly to the cost of management; and consequently would reduce the profits. He should like to ask Mr. Ineson whether he was made responsible by his Directors for these special engineering works, or whether he was able to have assistance from others who were perhaps more particularly acquainted with these matters, and so have some of the responsibility taken off his shoulders. Perhaps it would also be of interest if the author would state the radius, or the extent of the curve to which he understood he had built the retaining-wall—whether it had a quick radius, or a more segmental form? He should also like to know the kind of piles used, as there were some differences of opinion as to the most suitable form of material to employ for such purposes. Mr. Ineson appeared to have overcome his difficulties with a great deal of resource; and he was to be congratulated upon that point.

Mr. Ineson, in reply, said he was gratified to learn that the paper had been interesting to the members; and he hoped if any of them were placed in such difficulties as those (they could not be placed in a similar position), they would have the

patience he had had to exercise to deal with the trouble. In answer to Mr. Robinson, he was responsible for the whole of the work. It was executed on his own suggestion; but, in order to strengthen him in his proposals, his Directors thought it was advisable that he should consult an Engineer from London. This he did; and the report of that gentleman entirely approved of the methods he proposed to adopt to prevent further slipping. The piles used were pitch-pine, 10 inches square. They were all buried—not exposed. They were not all driven exactly to the depth of the greensand, because, in driving through the gault, it was impossible to drive with water. In the excavation, there was plenty of water to commence the driving. They got through that into the hard gault; and therefore they had to drive hard through the gault. In some cases, through the hard driving, the piles broke off at 20 and 21 feet; but the remainder were driven varying from 25 to 30 feet, and went from 12 to 18 inches in the greensand. The radius of the ring was 42 feet; so that they could get about a 70-feet gasholder in when required.

The PRESIDENT observed that, when they were able to consider at leisure what they would have done in similar circumstances, they would be able to recognize the true value of Mr. Ineson's work. They must congratulate him upon the success which had attended his efforts; and he would propose a hearty vote of thanks to him for having prepared and read his interesting paper.

Mr. F. C. TAYLOR (Shanklin), in seconding the motion, observed that he watched the work described almost from its commencement. He saw the slip; and he thought at the time it would never be possible to do anything with it. It was due to Mr. Ineson's pluck that he had brought it to so successful an end. The shareholders of the Ventnor Gas and Water Company would be thankful for what he had done; and it was a monument of his skill and perseverance.

The motion was heartily agreed to.

Mr. INESON briefly expressed his appreciation of the manner in which the members had received his paper.

THANKS TO THE PRESIDENT.

Mr. SAINSBURY proposed a vote of thanks to the President for all that he had done to make the meeting a success. The address he had delivered augured well for his year of office.

Mr. J. H. GRAY (Weston-super-Mare) seconded the motion.

Mr. DREW, in supporting the motion, remarked that the President had referred to the use of oil-lamps in the city. He believed that many people thought they were doing something towards keeping up the antiquity of the place by using those antiquated means of lighting.

The motion having been unanimously adopted,

The PRESIDENT acknowledged the vote; and this ended the business.

INSPECTION OF THE GAS AND WATER WORKS.

The members then inspected the gas-works, which are situated in close proximity to the offices. At the time of the visit of the Association to the city in September, 1889, the works were described in the JOURNAL; but since then they have undergone considerable change. The old residence has been pulled down; and a new one has been erected upon the rear garden ground—the frontage having been opened up for storage purposes and a weighbridge. The offices have also been doubled, and show-rooms opened. The present make of gas is 66 million cubic feet per annum. There are two retort-houses, with five benches of eight 16 in. by 9 feet retorts in each (with the exception of one setting of six 21 in. by 15 in. by 10 ft. retorts for comparison). The lower retort-house remains under direct firing; but the upper retort-house has been converted to Drake's generator furnaces. In the last of these, tar-firing is under trial. The continuous subway is used. Enlarged hydraulics and ascensions have been erected throughout, with overhead tank flushing arrangements to remove the cause of stoppages. Coal weighing at the stores outlet has also been adopted. One of Cutler's water-tube condensers has been substituted for the plain tube form; and the water is returned to the yard for use. The Paddon washer has been supplemented by one of Cockey's vertical washer-scrubbers. The vertical annular condensers have been converted for the steam and air process, as described in the communication Mr. Dexter made to The Gas Institute last year. The purifiers (four in number, and measuring 24 ft. by 12 ft.) work with natural oxide, with the above-mentioned arrangements immediately preceding them; but otherwise they remain unaltered, with the revivifying-floor above. A new station meter has been erected outside the works, but adjoining the offices; and independent inlet-mains have been arranged from here to the two gasholder stations, which are situated at Andover Road and Water Lane. At the first station, there are two untrussed crown holders (one a single and the other a double lift), each of 100,000 cubic feet capacity. At the Water Lane station, there is one double-lift holder and cast-iron tank, with a capacity of 100,000 cubic feet. This is situated in the lowest part of the town. Two new trunk mains have been laid; and the city has been divided into three districts—upper, middle, and lower—each worked with a separate holder to secure uniformity in distribution. With regard to the water-works (which were subsequently visited), the plant consists of three compound condensing beam engines—70, 60, and 30 horse power respectively—and one set of three throw pumps. The two former pump from four chalk wells (the pumps being 165 feet below the ground) into covered reservoirs of 300,000 and 500,000 gallons capacity respectively upon the same site. The 30-horse power engine and three throw pumps deliver water from these reservoirs to one of 150,000 gallons capacity, half a mile beyond upon the higher ground, for high-pressure service. Of the three boilers, one is converted for forced draught with dust fuel; and the other two are fired with coke or tar as occasion suits. The distributing system has been divided up into three principal trunk mains for varying levels as in the gas supply, and sub-divided into six districts, each controlled by Deacon waste-water meters. These arrangements have enabled a constant supply to be maintained in place of intermittent; and the output has been reduced from above 60 gallons to 30 gallons per head per day.

The day's proceedings were concluded by a dinner at the Royal Hotel.

OHIO GASLIGHT ASSOCIATION.

(*Concluded from p.* 845.)

The next item on the programme was a paper by Mr. C. V. Newman, of Peoria (Ill.), entitled "Hints on Handling Gas-Stoves." Mr. Newman acquired some experience as a salesman representing various gas-stove manufacturers, before accepting his present position of Superintendent of the Gas-Stove Department under the Peoria Gas Company. He issued a neat catalogue, and had a good show of apparatus in a large room at the gas offices, where cookery demonstrations were also held weekly; a special point being to have one on the last day for discounts, on which occasion there was always a good attendance. He advertised liberally; and was also well backed up by the Gas Company, who made a special rate of 3s. 1½d. per 1000 cubic feet for gas used as fuel. The results were fairly satisfactory; as after holding office a year, he had sold 200 stoves, while dealers had placed another 100. All stoves sold were fixed complete at a uniform charge of 16s. 8d. per stove. He made a house-to-house canvass, offering to fix stoves on approval, and to accept payment by instalments; and this had proved a satisfactory proceeding. He personally explained the way to use each appliance fixed, and confined his stock to the best makes. The increase in consumption already secured was equivalent to over 9 million cubic feet per annum.

The President having invited Mr. Cowdery to open the discussion, that gentleman said that at Milwaukee he made a special effort in the way of introducing gas-stoves about four years ago. He offered a special rate of 3s. 4d. per 1000 cubic feet for gas used as fuel—the regular price being 5s.; and on account of representations from the dealers, his Company decided not to sell stoves themselves, but to leave that department to the trade. The results were satisfactory; and he had now 7000 fuel meters running, and 17,000 lighting ones, while the fuel consumption amounted to one-third of the whole. Mr. Jones said he either sold stoves at cost or put them out on hire; and he found many people preferred to hire. Mr. Jenkins would like to hear more about hiring, or selling by instalments, and also about heating-stoves. Last winter he put out about £120 worth of Backus heating-stoves on hire; charging 10 per cent. on list prices as rent. The rent and the additional consumption gave a return of about 40 per cent. on the investment. He had no complaint of odour or condensation of moisture from the stoves. Mr. Penn found no odour if the lower pan was kept charged with water; but there was some condensation of water on the walls of the rooms in which the appliance was used, unless the ventilation was good. Mr. Cowdery had heard that, if several Backus heaters were used in a house, it would get damp after a month or two, and there would be some odour. Mr. M'Donald had heard the same thing with regard to gas-fires; and it was a question as to the structure of the walls. If these were unpainted, the moisture could escape; but if the walls were rendered quite air-tight by being painted inside and out, the moisture would condense and stream down the walls in cold weather. Water was one of the products of combustion of gas; and if it was not conveyed away, it must condense somewhere. Heating without ventilation was economical, but not healthy; and there should be proper flues for getting rid of the products of combustion. Mr. Sloan said he was agent for the Backus Company; but of a large number of stoves sold, there had been but little complaint on the score of moisture and dampness, and the reason was simply that people did not live in hermetically sealed rooms. He used the Backus heater successfully in his own house. Moisture had shown a tendency to collect on one or two of the windows; but he prevented this by putting in double sashes. From tests that had been made, the carbonic acid in a small room in which one of the heaters had been used for 6 or 7 hours, did not exceed ½ per cent.

A paper on "Carbide of Calcium" was read by Mr. H. L. Doherty, of Columbus. After summarizing the scientific and other facts already known about this compound and acetylene, he said that but little could be expected from it as an enriching agent, as it cost from two to five times as much as naphtha; though he must admit that it offered a simple and ready means

of bringing up poor gas to the desired standard. But he thought the opening for carbide of calcium as a material for charging automatic gas-machines was a very promising one. Acetylene could be stored in the liquid form; and being a gas, and not vapour, it was not liable to re-condensation. It would, therefore, prove a strong competitor with gasoline machines, and with Pintsch gas.

Mr. W. W. Goodwin followed with a paper on the same subject, detailing some experiments he had witnessed in the laboratory belonging to Mr. T. L. Willson, the discoverer of the process for commercially producing carbide of calcium, and also giving a full description of the manufacture. He proceeded to illustrate by experiments the production and properties of acetylene.

The next item was a paper on "Cannel Coal," by Mr. Graham Macfarlane, who remarked that he was not a gas engineer, but a miner and shipper of cannel; and that his object was to give some facts as to the location, nature, and extent of some of the deposits of cannel coal now available for the use of American gas companies. Except under unusually favourable circumstances, a cannel that did not yield a good coke was shut out by the competition of petroleum. As to the formation of cannel, he favoured the view that it was derived from a highly resinous vegetation. His view of cannel as an enricher, compared with oil, was necessarily biassed; but he believed the public preferred cannel. Some years ago, one of the General Electric Lighting Company's agents gave him a list of the towns where the strongest gas competition was found; and it was a singular thing that in 80 per cent. of these towns, cannel was used as an enricher. The most famous American cannel was the Breckenridge, found on the eastern boundary of the western coal-field of Kentucky, and now believed to be practically exhausted. The Cannelton mine of West Virginia enjoyed for several years almost a monopoly of the American cannel trade; being more conveniently situated for transit than the Breckenridge. The original deposit was exhausted; but a new mine had been opened in the neighbourhood, which was said to yield an equal quality of coal. There were mines at Johnson County, Kentucky, which had been successfully worked for some years. Their products—known as "Whitehouse," "Birdseye," and "Chattaroi"—were well thought of by gas engineers, and were also good domestic fuels. The Kentucky Cannel Company and Lexington Mining Company, in Carter County, produced somewhat costly, but high quality cannels; and the Bear Creek was another popular Kentucky cannel. The Pineville Cannel, raised near Pineville, was exported to South America, as it stood transportation well. There were several cannel mines in Ohio and Indiana; but their trade was mainly a household one.

The President called upon Mr. Nash, who said he used chiefly a bituminous coal yielding 14-candle gas, and brought this up to 17¼ candles by means of 15 per cent. of Butts cannel. Mr. Butterworth said that both cannel and oil had advantages and disadvantages, and which to use was largely a matter of prices. The quality of the coke was an objection with regard to many cannels; but, on the other hand, there was less trouble from stoppages than with naphtha. An 18-candle gas from naphtha would probably be as valuable as one of similar quality from cannel, and not so likely to smoke. Mr. Macfarlane, replying to the discussion, remarked that cannel at 21s. per ton was about even with naphtha at 1¼d. per gallon.

The Question-Box was then opened; and in reply to an inquiry as to the best way of treating iron sponge for revivification, Mr. Hayward urged the importance of good washing and scrubbing, to keep tarry matters out of the purifiers. Material supposed to be spent could be recovered in some measure by exposure out of doors for a year or two. When thrown out of the box, it might be left in a heap to get warm; but, of course, it must not burn. It should be freely exposed to the air; and in cold climates he did not object to the use of steam. Mr. Armstrong thought the question of temperature also entered into the matter of purification. Gas should not be admitted at a temperature greatly in excess of that of the oxide in the purifier. Regarding a question as to whether street-main governors were a success, Mr. Hayward said there were various kinds of governors. The old balance maintained even pressure with varying volume; but the new automatic governor did more—it changed the volume and pressure also. An increased demand caused greater pressure; and a diminished demand, less pressure. This was especially worthy of attention in connection with the supply of fuel gas. In many localities, gas could not be efficiently distributed without district governors. Mr. Douglas remarked that the success of the street governor depended upon mains of ample size. Mr. Holmes said that, by putting in an automatic governor, he reduced his unaccounted-for gas to the extent of one-half. Some other questions were dealt with; and the meeting closed.

The Price of Calcium Carbide in New York.—Referring to the price of carbide of calcium, *Industries and Iron* remarks that the figure of £3 10s. per ton, originally given as the cost of producing this material with natural power, has never been sustained, and was indeed doubted from the first. Our contemporary states that carbide of calcium, made under the Willson patent, is now being sold in New York, in 1-lb. and 2-lb. bottles and 5-lb., 10-lb., and 50-lb. jars, at prices ranging from 1s. to 2s. per pound.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

Home Counties District Meeting at Brighton.

An unusually large number of members of this Association journeyed to Brighton last Saturday, to be present at the home counties district meeting, which was held in the Royal Pavilion, by permission of the Mayor (Alderman Botting) and the members of the Pavilion Committee. The Mayor, in receiving the visitors, accorded them a hearty welcome on behalf of the Corporation. Mr. A. M. Fowler, M.Inst.C.E., the President of the Association, then took the chair; and the usual formal business was transacted.

Mr. F. J. C. May, M.Inst.C.E., the Borough Engineer and Surveyor, read a paper on "Brighton and Its Municipal Works." The special point of interest to our readers was that portion of the communication which referred to the drainage system of the borough, which is the outcome of the combined experience of Sir R. Rawlinson, Sir J. Hawkshaw, Sir J. Bazalgette, Mr. Hawksley, and Messrs. Bright and M'Lean, in conjunction with Mr. Lockwood, the former Borough Engineer. The construction of the sewers has been carried out so as to render them as much as possible self-cleansing. This was somewhat difficult, owing to the steep gradients of many of the streets, in several of which it was found necessary to make the sewers in a series of steps. There were at first three outfalls into the sea; but a new intercepting sewer was completed in 1874. A system of large open ventilating shafts, formed of glazed stoneware tubes built into brickwork and carried up wherever possible, has been almost entirely substituted for the air-grates formerly used for ventilating the main sewers; the latter method having proved imperfect in consequence of the gradients. The intercepting sewer is almost entirely closed; but it is efficiently ventilated by a furnace at Rocdean, kept continuously in operation. The intercepting sewer, which receives the whole of the sewage of Hove, is 7¼ miles long, and is built of brickwork in cement. Formerly the sewage was conducted seawards from the intercepting sewer by means of three wrought-iron sewers 4 feet in diameter, jutting a length of 300 feet from the face of the cliff; but these tubes have recently been extended, so that they now reach a distance of 1030 feet from the cliff. By this means the Corporation have been relieved from all anxiety or trouble on the question of the disposal of the sewage. An extension of the main sewers is now being carried out by Messrs. B. Cooke and Co., of Battersea, so as to properly drain the outlying areas of the town in the case of heavy rainfall. A refuse destructor is also being constructed; and the execution of various sea defences will shortly be offered for competition. No discussion took place on the paper.

Mr. A. Wright, the Borough Electrical Engineer, contributed a paper dealing with "Points of Interest in the Development of Electricity Supply at Brighton." Having traced the history of electric lighting in that town, the author referred to the starting of the municipal electric light station in 1891, and to the acquisition by the Corporation, in 1893-4, of the goodwill of the local Electric Light Company. The Corporation, recognizing in 1893 that the two-wire low-pressure direct-current system could never be capable of supplying economically the whole of the borough from their single generating station, changed their entire system to the three-wire method. Last year the mains were extended in all directions, and high-pressure alternating-current dynamos were put down to supply the residential districts in the north of the town. According to two tables presented by the author, the actual cost, exclusive of redemption and interest, of supplying electricity from the Brighton station was 2·3d. per unit last year, or less than that of any other central station; while the sale of electricity per head, taking all the towns having more than 50,000 inhabitants, was greatest in Brighton—the figure being 4·93 units sold per inhabitant. The conclusion to be drawn, the author stated, from diagrams exhibited was that the total monthly expenditure depends much more upon the maximum rate at which the generating plant has to supply electricity during the year, than upon the actual quantity supplied. Bearing this fact in mind, the author introduced a tariff which enables the Corporation to offer, to those consumers who use their demand regularly four hours a day, electricity at 4d. per unit, though coal costs upwards of 20s. per ton. The cost of supplying electricity in Brighton diminishes according to the length of time the demand is on per day; and the author thinks that for street lighting (the demand being in this case on an average eleven hours per day, under which circumstances electricity can be furnished at 2d. per unit with a fair margin of profit), the time cannot be far distant when every street in the neighbourhood will be electrically lighted, for he considers there is no other suitable form of artificial illumination that can compete with electricity at this price. The unique feature of the Brighton station is the combination of the high and low pressure systems for supplying the residential districts. In this case, the low-pressure direct current is employed at light loads and the high-pressure alternating current system at heavy loads. The reason for this is that the low-pressure system is most efficient at light loads, and the high-pressure alternating method most efficient at heavy loads. When it is remembered, remarked the author, in conclusion, that periods of light loads on the average are ten times as long as those of

heavy loads, it must clearly be unnecessary to supply, by means of high-pressure feeders and transformers, those parts of the town which can be so much more economically supplied by low pressure through the ordinary distributing-mains. It was considered advisable to answer any questions raised in the paper on the members inspecting the electric light station.

Mr. J. Johnston, Assoc.M.Inst.C.E., the Corporation Water-Works Engineer, next read a paper on "The Supply and Distribution of Water at Brighton." In referring to the succession of chalk downs amidst which the district is situated, the author stated that the heavy rains percolate through the pores of the chalk into the fissures, and that they are either carried off by these into the sea, or burst forth in springs. It is by the intersection of these fissures by adits or headings driven from wells that the supply for the Corporation water-works is obtained. There are three works, from which the water is lifted to a series of reservoirs. At the Lewes Road works, there are two pumping-wells, each 93 feet deep, connected by adits; and leading from these are about 2152 feet of adits. Two compound beam-engines of the Woolf type, capable together of raising to the surface 6½ million gallons per day, and furnished with steam from six Cornish and two Lancashire boilers, form the pumping plant. At the Goldstone works, the pumping-wells are 168 feet deep. Similar engines, two in number, to those at the first-mentioned works are in use; being erected directly over the walls. There are two deep-well pumps at the bottom of the wells, operated from either side of the centres of the beams. A different type of engine—a compound surface condensing engine—geared to drive two sets of three-throw deep-well pumps, is installed at the Patcham pumping-station, where extensions are in progress. In consequence of the physical features of the district, the system of supply has been arranged in five zones, known as the low, middle, high, higher, and highest service systems. Each zone is supplied from separate reservoirs with its own system of mains—ample pressure being provided for each zone. In case of necessity, the water can be let down from the highest to the lowest zone through a system of division-valves; the water from the higher reservoirs being prevented from entering the lower ones by self-acting valves placed in each reservoir. The total capacity of all the reservoirs is 9¼ million gallons; but these are not intended so much for storage as for service purposes—the storage being naturally formed in the chalk from which the water is obtained. These reservoirs are built of brickwork in cement, and are formed in the chalk. Puddle has not been used; but the insides are lined with two courses of tiles set in neat cement. They are covered in with brick arches 4½ inches thick, which spring from piers and "jack" arches; and from 12 to 18 inches of mould is laid on the covering arches. By this means the water is kept cool and pure, and the growth of vegetation, which takes place so quickly in chalk water when exposed to light and air, is prevented. The water undertaking was carried on by the Brighton, Hove, and Preston Water-Works Company until 1872, in which year it was purchased by the Corporation. A constant supply is provided for every new house; and this system is gradually being substituted for the few remaining intermittent services. The earlier works were designed by the late Mr. J. Easton, who was succeeded by his son, Mr. E. Easton. No discussion took place on this paper.

After luncheon, the members visited the various municipal engineering works.

Society of Engineers.—At the ordinary meeting of this Society last night, Mr. C. Mason, Assoc.M.Inst,C.E., the Surveyor to the Vestry of St. Martin's-in-the-Fields, read a paper on "Street Subways for Large Towns." The author began by pointing out the necessity for subways—the present underground arrangements being, he said, unsatisfactory; and he then referred to the powers possessed by the companies who now occupy the subsoil of the streets. He remarked on the companies' objections to bye-laws, and showed that municipalities are losing control of the public ways. Some early subways were mentioned; and several points in the construction, inspection, and supervision of subways were adduced. We may notice the paper at greater length in an early issue.

The Royal Society's Conversazione.—The first *conversazione* of the Royal Society for the present season was held at Burlington House last Wednesday; the guests, of whom there were a large number, being received by the President, Lord Kelvin. The exhibits were very numerous; and opportunity may serve for noticing some of them in a subsequent issue. Electrical science was well represented; but gas was not absent. Professor Roberts-Austen gave an exhibition of the electrical furnace as used for the fusion of metals with very high melting-points; the recent work of M. Moissan in this direction being in the main adopted. Professor Ayrton showed a simple apparatus for determining the mechanical equivalent of heat; and Major Cardew sent an exhibit having reference to the explosions in St. Pancras. The President of the Institution of Electrical Engineers (Mr. R. E. Crompton) had a display of electrical heating appliances. The chemical exhibits were not numerous; but the spectra of argon, and helium mixed with argon, shown by Professor Ramsay, proved highly attractive. Professor Vivian B. Lewes conducted some effective experiments with acetylene, to show how it could be employed for illuminating purposes.

REGISTER OF PATENTS.

Rotary Pumps, Blowers, and Exhausters.—Furness, E., of Cannon Street, E.C. No. 8530; April 30, 1894.

The claims for this invention are: (1) In a rotary engine, motor, pump, blower, exhauster, or fluid-meter having an outer cylinder with an abutment, the inside revolving cylinder or piston turning on a crank pin, crank, or eccentric on a shaft, and rolling round on the inside circumference of an outer cylinder, being thrust outwards from a bearing central with the inside circumference of the outer cylinder, and automatically kept pressed up against, and in constant contact with, the inside circumference of the outer cylinder. (2) In combination with this inside revolving cylinder or piston, an eccentrically bored bush-piece, which revolves with the crank-shaft in a bearing central with the inside circumference of the outer cylinder, and which, by means of springs attached to levers or discs fixed on the bush-piece and on the crank-shaft, is caused to have a tendency to turn round on the crank-shaft, so as to cause the inside revolving cylinder or piston to be automatically kept pressed up against, and in constant contact with, the inside circumference of the outer cylinder.

Water-Meters.—Boult, A. J.; communicated from T. Derichs and Hegenscheidt Bros., of Brussels. No. 17,780; Sept. 18, 1894.

This invention relates to water-meters of the Kennedy type, and appertains, on the one hand, to the arrangement of the four-way cock, with cross-passages; and, on the other hand, to the clockwork movement (regulating itself automatically by the stroke of the piston), to the substitution of a silent feed-wheel in lieu of the ratchet, to dispensing with tamping or packing for the distributing-cock, and to the provision of automatic packing for the piston-rod—tightening itself by the water-pressure in the meter.

Attachments to Gas-Burners for Heating and Lighting Purposes.—Zimer, F. W., of Fitzroy Square, London. No. 21,660; Nov. 10, 1894.

This invention has for its object to combine in one article an atmospheric gas-heater and a secure stand (made hitherto separately); and also to use, in connection therewith, a separate so-called "drop light," which may be employed not only for supplying the gas to the stove, but also for lighting purposes, with an adjustable and attachable shade, when desired.

Manufacture of Gas from Liquid Hydrocarbons.—Pinkney, C. W., of Smethwick. No. 22,184; Nov. 16, 1894.

This invention has for its object to provide means "whereby the greatest possible percentage of gas from heavy oils is produced, and imperfect gas is prevented from passing from the retorts or gasifiers." It also provides means for feeding the oil to the retorts or gasifiers, whereby in case of the passages for the gas from the retorts being stopped or clogged, the stoppage will be indicated, and the supply of oil cut off.

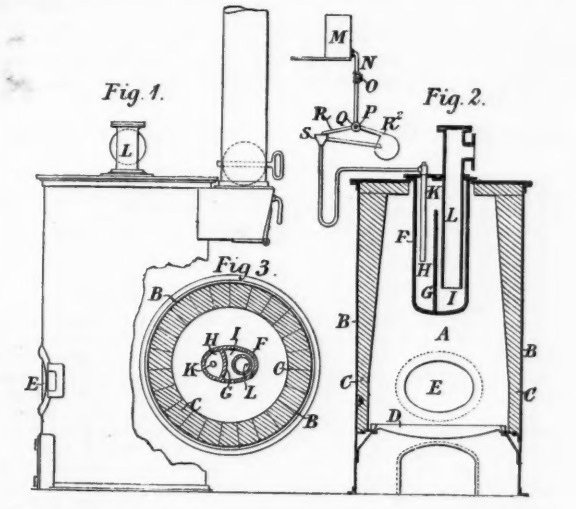


Fig. 1 is an elevation of the gas-generating portion of the apparatus; the oil-feeding device being omitted. Fig. 2 is a vertical section, with the oil-feeding device in position. Fig. 3 is a horizontal section.

A is a furnace, consisting of an outer metal case B, lined with fire-brick C or other non-conducting material. D are the fire-bars or grate, which supports the fuel fed into the furnace through the fire-door E. In the top plate or crown of the furnace is a hole, through which is inserted the retort or chamber F, in which the gas is generated. The retort is suspended centrally in the furnace, so that the heat from the fuel can act on the whole of the exterior surface of the retort. The retort is divided by a partition G into two compartments H and I; the partition extending upwards from the bottom of the retort to within a short distance from the top, where the two compartments communicate.

Into the compartment H depends the oil-feed pipe K; and into the compartment I, the gas-outlet pipe L, which extends to within a short distance from the bottom of the retort. M is the oil reservoir, provided near its bottom with a discharge-pipe N, fitted with a cock O, to regulate the flow of oil. To the lower end of this pipe is connected the plug P of another cock, the shell or barrel Q of which constitutes the boss of a two-armed lever R R², having the plug P as its fulcrum on which it turns. In the plug is a longitudinal passage, communicating at one end with the passage through the pipe N, and at the other

end with a lateral passage in the plug. The arm R of the two-armed lever is tubular, and communicates with a lateral passage in the shell or barrel Q of the cock, which latter passage coincides with the passage in the plug P when the lever is in the position shown in fig. 1. The oil then flows from the reservoir M through the pipe N, and thence by the passages in the plug of the cock and the shell or barrel Q into the tubular arm R of the two-armed lever. The outlet end of this lever arm is situated directly over a mouthpiece S on one end of a U bent or seal pipe (fig. 2), the other end of which is in communication with the feed-pipe K, depending into the compartment H of the retort.

The retort being heated to the required temperature, the oil admitted to the compartment H of the retort becomes vaporized; the vapour passing upwards in contact with the sides of this compartment and over the top of the partition G into the compartment I, through which the vapour descends, and in which it is converted into perfect gas, which passes thence upwards through the outlet-pipe L, and may be conducted into coolers or condensers, or to the place of storage.

The patentee says: "I have found in practice that, by causing the hydrocarbons to travel over an extended moderately heated surface, the liability to unvaporized oil passing from the retort is prevented; whereas if the hydrocarbon be passed quickly over a highly heated surface in the retort, the tendency is to cause the oil to pass from the retort in an unvaporized condition, thereby causing waste and inconvenience by blocking the passages between the retort and the place of storage of the gas." Should any of the passages become clogged, means are provided whereby the oil in the bent pipe or seal is, by the pressure of gas in the retort, caused to flow through a branch-pipe near the upper end of the seal into a chamber on the arm R^2 of the double-armed lever. The weight of this arm of the lever being thus increased, causes the lever to turn on the plug P, and close the passage for oil through the plug, and thereby cut off the supply of oil to the retort.

Gas-Burners.—Willatt, J., of Nottingham. No. 2066; Jan. 29, 1895.

The patentee proposes the employment of either a flat ring surrounding the perforated base of an atmospheric burner (the ring being capable of being raised or lowered to entirely cover or partly cover the perforations in the base), or a perforated ring capable of being partly revolved either way round the perforations in the base of the burner. The object aimed at is that, when applied to the Welsbach incandescent light, if the gas supply is turned down low the supply of air is automatically reduced at the same time; and "lighting-back, a flickering light, and the groaning noise heretofore experienced is prevented." When applied to a Bunsen burner employed for chemical or other experiments, the supply of gas and air may be automatically regulated simultaneously for a large or small flame. If used with gas-fires or cooking-ranges, a large or small fire may be used without danger of lighting-back when the gas is turned low.

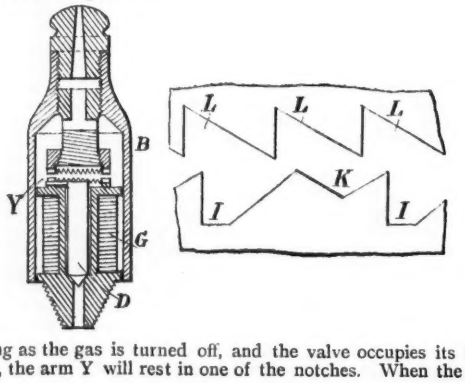
Rotary Blowers, Exhausters, and Pumps.—Green, T. W., of Philadelphia, U.S.A. No. 2111; Jan. 30, 1895.

This invention consists in the particular construction and arrangement (fully described by means of the detail drawings supplied) of those parts of the revolvers or pistons that are located between the wings or blades and form the locks or cut-offs, to prevent the escape and backward flow of the fluid acted upon. The general construction and operation of the driving parts of the blower are the same as those ordinarily used in this class of machines—as described in patent No. 7139 of 1894.

Electric Gas-Lighter.—Jahnsson, J, of Stockholm, Sweden. No. 3085; Feb. 12, 1895.

The object of this invention is to provide "an electric gas-lighter which will be positive in its action, will require no special adjustment, and (owing to its simplicity) will not get out of order."

D is the valve or valve-spindle, surrounded by coils G; and Y is an arm extending from the valve-spindle. A bar B of soft iron is located above the arm Y; the whole contrivance being enclosed in the usual manner by a case, supporting the burner proper at its upper end. In the path described by the arm Y, as the valve-spindle revolves about its axis, a pair of toothed guides Z are arranged concentric to the valve-spindle, one above the other. The upper one, on its under side, is provided with teeth having one perpendicular and one oblique side, while the lower guide has M-shaped teeth, placed zig-zag with reference to the upper teeth, as shown in the larger detail. The M-shaped teeth of the lower guide are separated by notches I, whose depth is greater than that of the notch K in each tooth; and this depth is such that, when the arm Y is resting at the bottom of such a notch, the valve D will be closed, and consequently the supply of gas to the burner shut off. In addition, one side of each tooth in the lower guide should be oblique, in order that the arm may be turned somewhat when it slides down along this side.



As long as the gas is turned off, and the valve occupies its lowest position, the arm Y will rest in one of the notches. When the gas is to be lighted, an electric current is passed through the coil; and the valve-spindle, becoming magnetic, is lifted to the bar B. The arm then strikes against the oblique side of the tooth above it, and is compelled to slide along this side to the bottom of the notch L; the valve-spindle being thereby turned about its axis. When the current is interrupted, the valve-spindle, drops, causing the arm Y to fall, not in the same notch as before, but in the next notch K, which is shallower than I, in consequence of which the valve is kept suspended, so that it cannot shut off the supply of gas. If the gas is to be shut off, a current is again sent around the valve-spindle, which is again raised against the bar B, causing the arm Y to slide along the oblique side of the overlying tooth to the bottom of the notch L, at the same time turning the valve. When the current ceases, the valve is free to drop into its lowest position, and shut off the supply of gas, because the arm Y now slips into the deep notch I succeeding the notch K; and as it is at the same time turned by the oblique side of this notch, it will pass by the point of the overlying tooth, and, when it is next raised, it will not enter the same notch as before.

Mantles and Supports for Same in Incandescent Gas-Lights.—Terrell, T., of New Court, Temple, E.C. No. 4324; Feb. 28, 1895.

The patentee's object is to remedy some (as he alleges) defects in the shape of, and supports for, the mantles used in incandescent gas-lamps. He proposes to form a ring of steatite, fire-clay, or other suitable refractory material, with a transverse bar, through which there is a hole to fit upon an upright supporting-rod. This central rod is shouldered at the top; made of steatite or other refractory material; and held in a socket in the top of the burner—the ring already mentioned being placed on it so as to rest on the shoulder at the top. The mantle is made so that its upper part tapers, and terminates with an inwardly projecting lip resting on the ring, so as to be supported uniformly all round. In this way, it is claimed that the area of escape for the products of combustion is regulated and adjusted, and rocking or swinging of the mantle is prevented.

APPLICATIONS FOR LETTERS PATENT.

7722.—Denayrouze, L., "Gas-burner operating with intimate mixture of gas and air." April 17.

7778.—Gareis, A., "Cap for incandescent gas-burners." April 18.

7791.—Custodis, A., "Weighing gaseous substances and indicating the composition of gas mixtures." April 18.

7797.—Price, J., "Coin-freed delivery mechanism or apparatus." April 18.

7875.—Svenson, J. V., "Burner for cooking-stoves." April 19.

7948.—Shanks, J., jun., "Taps or stopcocks." April 22.

8068.—Abel, C. D., "Liquid-meter." A communication from La Compagnie Anonyme pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. April 23.

8071.—Arendt, M., "Lamps." April 23.

8080.—Tritton, C. H., "Water-heating apparatus, for immersion in the water to be heated, with means of evaporating any water of condensation internally formed therein, for attachment to gasometers or for other uses or purposes." April 23.

8120.—Merichenski, M., and Moffat, J. D., "Production of gas from oil." April 24.

8136.—Smith, J., "Regulating or controlling the flow of fluids." April 24.

8197.—Turner, E., and Harding, G. J., "Combined exhaust silencer and circulating pump for gas-engines." April 25.

8206.—Usher, J. M., "Lamps." April 25.

8213.—Moeller, J., "Lamp chimney-glasses." April 25.

8216.—Vandeesteen, B., "Water-meter." April 25.

8248.—Foster, H., "Gas and air valves for regenerative or other furnaces." April 26.

8317-18.—The Lamp Manufacturing Company, Ltd., and Welch, W. H. I., "Overhead regenerative gas-lamps." April 26.

8330.—Bower, H., "Treatment of gas liquor or like ammoniacal liquor, and obtaining useful products therefrom." April 26.

8355.—Klunzinger, J., "Ignition apparatus for gas and oil engines." April 27.

The Sale of Glasgow Residual Products.—The Glasgow Corporation Gas Treasurer reported to a recent meeting of the Finance Sub-Committee that the revenue derived from the sale of residual products from June 1, 1894, to March 31, 1895, amounted to £118,675, as compared with £98,957 during the corresponding period of the preceding financial year. There was thus an increased revenue of £19,718 over the ten months.

The Public Lighting of Liverpool.—The Liverpool City Council last Wednesday voted a sum of 200 guineas to the Special Lighting Committee for division among some of the staff of the public lighting department, in recognition of their arduous and extra services in connection with the reorganization of the lighting of the city. It was mentioned that a saving of between £8000 and £9000 per annum would be effected by the new arrangement.

The Newark Corporation and the Gas Company's Provisional Order.—At the monthly meeting of the Newark Urban Sanitary Authority on Monday last week, the Mayor (Mr. Doubleday), in moving the adoption of the minutes of the Gas Company's Provisional Order Committee, said he believed it was the general opinion of the Corporation and of the public that the money spent by the town in opposing the Order had been well laid out. Though they had not yet succeeded in obtaining compulsory purchase, still they had wrung several important concessions from the Company, one of which was that the standard price was fixed at 4d. per 1000 cubic feet less than was intended originally. Alderman Pratt seconded the motion, and said that, on behalf of the Directors of the Company, he could assure the members that if the result of the Board of Trade inquiry on the Provisional Order had been satisfactory to the Corporation, it had been equally so to the Directors. The minutes were passed.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Review of the Transactions of the Incorporated Institution of Gas Engineers.

SIR,—The somewhat hostile tone of the concluding paragraph in your review of the Transactions of the above Institution, referring to the "Bibliography of British and Foreign Gas Literature," needs some comment.

No one can be more conscious of the many imperfections and shortcomings of my work than myself. But, in self-defence, I think it only fair to point out that the whole of your criticism and suggestions were anticipated and met in my preface as originally presented to the Institution of Gas Engineers. The Council of the Institution, however, deemed it expedient to curtail the preface; and, as I feared, all those rejected parts, which otherwise would have completely disarmed the critic, have been turned against me in the review of the work. In justification of this, I may perhaps be permitted to quote one of the excluded passages alluded to—

> In future lists, the following additional information would enhance their value: The most important and most reliable works to be emphasized by printing their titles in larger type, or otherwise distinguishing them. Each title to be followed by a note or brief comment, indicating the substance and value of the subject-matter. *The publisher's name and address, and the price, to be added to the other information given; and, in the case of rare books, mention could be made of the libraries where they may be consulted.*

It will be seen from this extract that the critic's somewhat pedantic recommendations were altogether unnecessary so far as I am concerned. His acquaintance with the well-known *Engineering Magazine*, which he recommends me to study, is evidently superficial, or he would be cognizant of the fact that the publisher's name and address are in no case given in connection with the index having the "significant initials" in that magazine. It is this omission which he states renders my compilation not worth the printing, although many of the best bibliographies have been constructed on the same lines. In case your readers may be led to suppose that this very excellent magazine gives a complete record of gas literature, I may point out that only about two of at least twenty gas periodicals published in Europe are ever referred to.

Your readers will readily appreciate that to make a complete list of books from the beginning of the century up to the present time is a very different matter from merely recording what is published month by month in a few trade journals, probably sent to the Editor for the purpose as they are issued from the press. I am, however, very pleased to find that there is "another Richmond in the field" who can improve upon the work I have initiated; and therefore I gladly leave it in his hands, and look forward to the publication of his perfect list.

27, *Great George Street, S.W., May* 4, 1895. F. S. CRIPPS.

[We regret that Mr. Cripps has permitted himself to be ruffled by the terms in which the fruit of his bibliographical labours was reviewed in our columns. We have no idea of what he means by his concluding remark, as we have no knowledge of any such pending publication as he seems to refer to. We desire to take this opportunity for correcting an error which our reviewer inadvertently made when stating that Mr. Cripps's list has been separately published, as it appears that this is only true of a small number of copies privately prepared for the use of some of those who assisted him in his work.—ED. J.G.L.]

Georgetown (British Guiana) Gas Company, Limited.—At the half-yearly general meeting of this Company on the 14th inst., the Directors will report that the balance of the profit and loss account (£581) will be sufficient, after transferring £50 from the reserve fund, to enable them to recommend the declaration of a dividend for the half year ended Dec. 31 last on the preference share capital at the rate of 8 per cent. per annum, and on the ordinary share capital at the rate of 3 per cent. per annum, both less income-tax (except upon those dividends payable to the local shareholders). The Engineer (Mr. T. B. Younger) reports that the works are in good order.

The Price of Gas at Salford.—The business paper at the meeting of the Salford Town Council last Wednesday contained the following notice of motion in the name of Alderman Dickins: "That, in view of the present financial position of the borough, the price of gas be increased 3d. per 1000 cubic feet to all consumers, from the 24th of June next." He stated that his object in putting the motion on the *agenda* was that something might be done by the Gas Department towards relieving the borough from its financial difficulties. An increase of 3d. would have been equal to £13,000—a handsome contribution from those who were using gas. But he was told by the Chairman of the Gas Committee that it would be impolitic to proceed with the motion, and, that being so, he withdrew it.

New Offices for the Cardiff Gas Company.—The present offices of the Cardiff Gas Company are to be replaced by more convenient and imposing buildings; and the work has been already commenced. The designs have been prepared by Mr. Henry Morley, the Company's Engineer. It is intended that the new premises shall not only cover the whole of the existing site, but a large area in addition—in fact, they will be nearly four times the size of the present buildings. The new building will consist of two storeys; and it will be constructed of Newbridge stone with Bath stone dressings. The ground floor is to consist of a large vestibule, on either side of which will be the general offices, 52 feet by 31 feet, and show-rooms, 36 feet by 31 feet; and there will also be large show-rooms, stores, Secretary's offices, ledger clerk's offices, strong-room, and inspectors' offices. The second floor will consist of the Board-room, 34 feet by 31 feet, Engineer's office, clerks' office, drawing-office, laboratory, printing-room, and stores. The show-room will be elaborately fitted up; and the internal arrangements are to be on the most modern and scientific scale.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Private Bills since the re-assembling of the House after the Easter recess:—

Bills read the first time: Cranbrook District Water Bill, Gas Orders Confirmation Bill, Gas and Water Orders Confirmation Bill, Hayward's Heath Gas Bill, Water Orders Confirmation Bill, York New Water Bill.

Bills read a second time and committed: British Gaslight Company (Staffordshire Potteries) Bill, Brymbo Water Bill, North Middlesex Gas Bill, Whitby Water Bill.

A petition against the Whitby Water Bill has been presented from the Whitby Urban District Council.

HOUSE OF COMMONS.

Monday, April 29.

CHELSEA WATER BILL.

Mr. J. STUART moved that the order of the 25th of February, committing the Chelsea Water Bill to a Select Committee, be read and discharged, and that the Bill be referred to the same Committee to which the Lambeth Water (Transfer) Bill, the Southwark and Vauxhall Water (Transfer) Bill, and the Lambeth Water Bill had been sent. He said the Bill promoted by the Chelsea Water Company was similar in character to that promoted by the Lambeth Water Company—being for an increase of capital; and as the question of the purchase of the undertakings of the Lambeth and Southwark and Vauxhall Companies by the London County Council had been referred to a Hybrid Committee, he thought that all Bills dealing in any way with the London Water Question should be sent to the same Committee.

Mr. BOULNOIS expressed the hope that the House would not consent to the course suggested, which was a very unusual one. The object of the Chelsea Bill was a small matter only—the Company merely asking for powers to raise £50,000 of additional capital, to enable them to put down a new main. The only questions for the Committee to consider were whether or not the work was necessary, and the money was needed to complete it. It was no secret that the County Council did not intend to push forward their Bill to acquire the works of the Chelsea Water Company. If the Bill were sent to the Hybrid Committee which would consider the London County Council Water Transfer Bills, it would never emerge from it; for it was quite certain that the labours of the Committee would be most protracted. The proposal of the hon. member was unreasonable, as it would put the Chelsea Company to great expense which ought not to be thrown upon them.

Mr. BRUNNER supported the motion. He thought the Company would not be put to any delay, as the decision of the Committee in regard to one Water Company would apply to all the others.

Mr. WHITMORE, in opposing the motion, contended that nothing could be more confusing to the Committee to whom it was proposed to refer this Bill than to have foisted upon it at the last moment the consideration of a totally new question such as had been raised by the hon. member for Shoreditch (Mr. Stuart). Beyond this, the period at which the proposal was made, and the additional time it would demand for consideration, would seriously diminish the chance the Bill might otherwise have of being passed in time to enable the Chelsea Company to deal with the necessities of the occasion. It would be a strange act on the part of the House if at the present time, when the Water Companies of London were practically on their trial for failure to fulfil their statutory obligations, they were to refuse to give powers to one of the Companies which were declared to be absolutely required in order to provide their district with a proper supply of water. He hoped the Government would not, by supporting the motion, assist in a most inconvenient and inexpedient step.

Mr. H. LAWSON said it would be a violation of the principle that Parliament had established to refuse to refer the Bill to the Committee who would deal with the water question. He asked the House to accept the motion, and pursue the course adopted in regard to similar Bills in 1890, last year, and again this session in connection with the Lambeth Water Bill.

Sir J. BLUNDELL MAPLE regarded this as a question concerning the consumer and also the public health; and he expressed the hope that the President of the Local Government Board would tell them what action the Government proposed to take with regard to this most important Bill. The matter had nothing to do with the questions referring to Water Companies which were to come before the Hybrid Committee. The present Bill simply referred to an increase of capital, which was necessary in order that the Company might adequately supply the wants of consumers.

Mr. LONG expressed his surprise that the President of the Local Government Board—a body responsible not only for the poor-law administration, but also for the administration of the laws affecting the public health of London—had not thought fit to say one word for or against the recommendation made for the procedure proposed in regard to this Bill. He pointed out that if the motion of the hon. member for Shoreditch was carried, and the Bill referred to the Committee appointed to inquire into the proposals of the London County Council to purchase the works of the London Water Companies, the practical result would be to postpone the consideration of the Bill for another session.

Mr. SHAW LEFEVRE said it had not been his intention to take any part in the discussion. The question was really one as to the best procedure, and it did not affect the principle of the Bill. If he thought that the effect of the motion would be to defeat the object of the Bill, he should not vote for it. He did not think the acceptance of the motion would lead to any postponement of the measure. The Committee would have time to deal with all the Bills; and he thought on the whole, it would be more convenient if the same course were adopted now as was adopted in 1890 and 1894, and the Bill referred to the Committee who would consider the other Bills.

Mr. KIMBER pointed out that the effect of the adoption of the motion would be to delay for a long period the construction of the works intended to be carried out by the Chelsea Company to give relief to the long-suffering water consumers of the district they supplied. He regarded the motion as an apt illustration of the strategy employed by the London County Council on the question of the water supply of the Metropolis. They had originally resolved to take parliamentary action in regard to two Bills which they thought would entail quite as much work as it was possible for any such body to get through during the session; but now a certain portion of that body who were anxious to carry out the policy they had long supported, took advantage of every opportunity they could obtain of hampering and worrying the ratepayers and consumers in every possible way, so that in the course of time they might be allowed, in order to get rid of their constant and vexatious opposition to everything that was proposed, to do exactly what they wished.

Sir J. LUBBOCK said the President of the Local Government Board had expressed a very confident opinion that the Hybrid Committee would have ample time to deal not only with the question of purchase, but with that raised in the Bill before the House. The hon. member for the Tower Hamlets (Mr. J. W. Benn) moved a short time ago in the County Council that they should not proceed with the whole eight Bills, but with two of them. The Council, of course, were pledged to go on with the eight Bills; but the reason for only taking two was that there probably would not be time for all the eight this year. The proposal of the hon. member for Shoreditch (Mr. Stuart) would only tend to delay and to increased legal expenses, which would ultimately fall on the ratepayers.

Mr. BARTLEY said it was monstrous to ask the House to rescind the order. The Bill having been read a second time with the assent of the Government, it ought to go on in the ordinary way. The hon. member who brought forward the motion did not represent the County Council in this matter more than anybody else, but was merely a private member. He hoped that the House would not stultify itself by agreeing to the motion, and that the Government would not be a party to anything so ridiculous.

Dr. MACGREGOR suggested the desirability of leaving local questions like this to the County Council for settlement (laughter), and so avoid taking up the time of the Imperial Parliament.

The House divided; and the numbers were: For the motion, 163; against, 129—majority, 34. The motion was therefore carried.

Friday, May 3.

LONDON WATER (TRANSFER) BILLS.

Mr. BENN moved that the second reading of the Chelsea Water (Transfer) Bill be adjourned till Monday, the 6th inst., in the hope that, in the meantime, an arrangement might be made for some further adjournment, on the lines suggested by the hon. member for Shoreditch (Mr. Stuart).

Mr. BOULNOIS said he hoped that by the date named the London County Council would have made up their minds as to whether or not they would proceed with this and the other Water Bills still on the paper. The repeated adjournments of the second reading of these Bills were exceedingly inconvenient, and left the Companies affected in a state of harassment. The Chelsea Bill was put down for second reading nearly three months ago. It was quite time the County Council told the House distinctly and plainly whether or not they meant to proceed with the Bills during this session.

Mr. BENN said the Council had nothing to add to the declarations already made in the House by the hon. member for Shoreditch.

Mr. BARTLEY said it was most inconvenient that hon. members should be brought down day after day for these Bills, which were put down "by order," and then find there was no intention to go on with them. Surely, if it was intended to proceed with the Bills, they should be put down for a definite date.

Mr. BENN remarked that if the hon. member for Marylebone (Mr. Boulnois) would consent to an adjournment for a month—[Mr. BARTLEY: Six months]—all the inconvenience mentioned by the hon. member for Islington (Mr. Bartley) would be avoided.

Mr. BOULNOIS said he would be quite willing to consent to an adjournment for six months. (A laugh.)

The second reading of the Bill, as well as of the East London Water (Transfer) Bill and the four other Bills relating to the acquisition of the undertakings of the Metropolitan Water Companies, was then adjourned till Monday (yesterday).

The following progress has been made with Private Bills since the reassembling of the House after the Easter recess:—

Bills read a second time and committed: Edinburgh and District Water Bill, Hebden Bridge and Mytholmroyd Gas Board Bill.

Bills reported: Bridlington and Quay Water Bill, Felixstowe and Walton Water Bill.

Bills read the third time and passed: Bristol Water Bill, Cranbrook District Water Bill, Felixstowe and Walton Bill, Hayward's Heath Gas Bill, York New Water Bill.

Bill withdrawn: Dublin Corporation Bill.

A petition for an inquiry into the management of the Metropolitan Gas Companies has been presented from Fulham.

A petition in favour of the London Water (Transfer) Bills has been presented by the Corporation of Reigate.

The following are the names of the members constituting the Hybrid Committee on the Lambeth and the Southwark and Vauxhall Water (Transfer) Bills and the Chelsea and Lambeth Water Bills: Mr. Baldwin (Bewdley), Mr. Billson (Barnstaple), Mr. Burnie (Swansea), Mr. Holland (Salford), Mr. Muntz (Tamworth), Mr. P. Stanhope (Burnley), Right Hon. D. Plunket (Dublin University), Sir J. Kitson (Colne Valley), Sir H. Stafford Northcote (Exeter). The Committee met yesterday to choose a Chairman and consider their course of proceeding.

The Committee on the Bridlington and Quay Water Bill have reported as follows: "The Bill is one for dissolving and reincorporating the Bridlington and Quay Water Company, Limited, the present nominal capital of which is £20,000; and power is taken in the Bill to raise additional share capital to the amount of £20,000, the maximum dividend on which is limited to 4 per cent. per annum, having been reduced from 5 per cent., the amount originally asked for. It was proved to the Committee that the additional capital would be required to be raised and expended in small amounts, mostly upon distributing mains and pipes; and it did not appear to the Committee that the offer of such capital by public auction, which would be attended with expense and inconvenience to the Company, would be for the advantage of the water consumers. The provisions of the Bill had, moreover, been agreed to by the Local Authority; and the Company had agreed to the insertion of a clause giving power to the authority to purchase the undertaking. The Committee are therefore of opinion that the insertion of a provision in the Bill for the offer of such capital by public auction or tender, ought not to be required." They amended the preamble and the clauses of the Bill.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, April 30.

(*Before Mr. Justice* WILLS.)

The Incandescent Gas-Light Company v. Cantelo.

This was an action for infringement of patent, but of a somewhat novel character. The articles sold by the defendant were admittedly the genuine manufacture of the plaintiffs themselves; and the real point was whether relief could be obtained in such an action for disregarding the conditions attached by the patentees to the use of the patented articles—in this case, the mantles employed in the incandescent gas-burners.

Sir R. E. WEBSTER, Q.C., M.P., Mr. FLETCHER MOULTON, Q.C., M.P., and Mr. TERRELL, appeared for the plaintiffs; Mr. BOUSFIELD, Q.C., and Mr. HOLLOWAY, for the defendant.

Sir R. E. WEBSTER, in opening the case, said the defendant was an ironmonger carrying on business at High Street, Sandown; and he had formerly been agent for the plaintiffs there. After he ceased to be so, he by some means procured several of the Company's mantles, and sold them in connection with burners not supplied by the Company, in contravention of the notice printed in red, and affixed to all the boxes in which the mantles were sent out. That notice was as follows: "Notice.—The licence to use this mantle is strictly limited to the person or persons purchasing the same, or on whose behalf the same is purchased from the Company or their agents; and it is purchased and sold at the reduced price of 1s. 3d. on the express condition that it is only to be used for the purpose of renewal, and not in connection with burners or apparatus not sold or supplied by the Company." Having given a description of the burner, &c., the learned Counsel said the only defence pleaded was non-infringement. He did not see how this could be made out; and the decisions, several of which he quoted, showed that the right of the patentee to the exclusive use of the patented article carried with it the right to impose such conditions as he thought fit on a licence to use it—such licence being the only justification which a defendant could set up, and which was, of course, implied in the sale. It might probably be said that the conditions would only bind those persons who had express notice of them; but he believed it would be found that the defendant had such notice.

Mr. BOUSFIELD said the mantles were purchased from Messrs. Hulett, of High Holborn, plaintiffs' agents, by a friend of the defendant. It was not until the latter opened the parcel, after receiving them, that he saw the notice referred to; and he did not consider he was bound by it, as it was not brought to his notice before the purchase. He should also submit, if necessary, that any claim the plaintiffs might have, would be by an action for breach of contract, not for infringement.

Mr. *J. Franklin Baker*, trading as Messrs. Williams and Co., High Street, Ventnor, plaintiffs' agent, then gave evidence of purchasing at the defendant's shop, on Feb. 11 last, a burner and mantle in a box. Defendant's assistant stuck a label, bearing defendant's name and address, over the red notice on the box. Witness sent the burner and mantle to the Company in London.

Mr. *C. B. Field*, a tradesman of Sandown, said he saw an incandescent burner in defendant's shop, and ordered one to be fitted up on his own premises. Shortly afterwards he ordered three others. One of these he sent to Messrs. Faithful and Owen, plaintiffs' Solicitors.

Mr. *J. Moeller*, the Manager of the plaintiff Company, described the process of manufacturing the patent mantles, and said their life depended very much on the burner to which they were attached. The Company had burners specially manufactured for the purpose. The red notice was first affixed in October, 1894. He examined the mantles and burners spoken to by the previous witnesses. The mantles appeared to be those manufactured by the Company; and he handed them to Mr. M'Kean, their Chemist, for examination. The burners were not those issued by the Company.

Cross-examined by Mr. BOUSFIELD: The defendant was formerly agent for the Company, but ceased to be so in the spring of 1893. When he was agent, the Company supplied him with goods without any restriction. Apart from the notice on the box, he did not think the Company had given the defendant any intimation that they had changed their mode of dealing with the mantles, or the conditions of sale. He had had none from the Company direct with their labels on them. Messrs. Hulett were agents for the Company in London. He knew nothing about the mantles in question having been bought from Messrs. Hulett.

Wednesday, May 1.

On the resumption of the proceedings this morning,

Mr. *Moeller* was further cross-examined as to the mode in which the mantles were made.

Justice WILLS remarked that he did not see the relevancy of the cross-examination.

Mr. BOUSFIELD said the defendant was sued for infringement of the plaintiffs' patents; and it was open to him to show that the articles in question were not manufactured according to the specification.

Witness said the mantles were soaked in a liquid which was sent over from Germany. He understood it was a solution of thorium and cerium; but he was not a chemist.

Re-examined: Judging by the light, he could tell whether a mantle had been prepared with thorium and cerium.

Mr. *M'Kean*, the Chemist to the Company, proved examining the mantles purchased from the defendant. He said they were made according to the plaintiffs' patent process.

Mr. TERRELL put in the judgment of Mr. Justice Romer establishing the validity of the patent, in order to entitle the plaintiffs if they succeeded, to costs as between solicitor and client.

Mr. BOUSFIELD submitted that no case had been made out.

After some discussion,

Justice WILLS said he should prefer to hear for himself the defendant's evidence.

Mr. BOUSFIELD said he would shortly state what his case was. The defendant was formerly agent for the plaintiffs, and when in that position he bought and sold the mantles without any suggestion as to any condition or restriction. After he had ceased for a considerable time to be agent, the plaintiffs altered their course of dealing, unknown to him, with a view, as far as possible, of getting a monopoly in their burners, for which they had no patent. When the defendant, in January last, wanted some mantles, as he had had the agency taken from him, he did not apply to the Company for them, but wrote to a friend in London to procure them for him at Messrs. Hulett's. His friend went and purchased them over the counter. Not a word was said about any condition; and it was not until the defendant received them that he saw the conditions.

Justice WILLS said it would not do, if the notice only came to his mind after the transaction was completed.

Mr. BOUSFIELD said that was one point; but there were several others.

Mr. *W. Coe* said he lived at Forest Gate, and was a telegraph operator. He had a letter from defendant, asking him to go to Messrs. Hulett and purchase six dozen of the plaintiffs' mantles, and enclosing him money for the purpose. He called and saw a saleswoman, and was then introduced to the Manager. He told him what he wanted; and the Manager said it was a large order, and asked where he came from. He (witness) gave his name and address; and then the Manager said they had not the required quantity in stock. He asked if he could send them to him, and if they were to be used by him. He replied that he was purchasing them for somebody else. The Manager said he would consign them to any address he gave him. They were only licensed to sell in London and within 12 miles; but, as witness came from within that distance, he would sell them. Witness then paid for them, and gave Mr. Cantelo's name and address. Nothing was said about the mantles only being used in connection with the Company's burners, or any condition as to the use of the mantles. He destroyed the receipt after the goods were delivered.

Witness was cross-examined at great length by Mr. MOULTON, but without any material result. He said he did not think he had kept the defendant's letters. Defendant sent him £4 to pay for the goods. He told Messrs. Hulett's Manager that he was not in the trade, and that the mantles were not for his own use. He declined to say where they were to be used. After this he said he would sell them if witness paid cash for them, as he lived within the 12-mile radius. He then gave the defendant's name and address. He had not quite sufficient money to pay for the mantles; but took a receipt for £3 18s., and sent the remainder before the goods were despatched. He did not preserve the receipt because the goods were delivered. He had no receipt for the balance. There was nothing on the invoice, so far as he remembered, about plaintiff Company's goods or conditions. Messrs. Hulett were general gas-fitters; and the invoice was on their usual heading.

Mr. *Cantelo* was then called. He said he was for two or three years agent to the plaintiffs in Sandown, and ceased to be so in 1893. In January, 1895, he wanted some mantles, and wrote to Mr. Coe, as a friend, to get them from Messrs. Hulett; and he ultimately received them. When he was agent, there was no restriction whatever on the sale of the mantles; and up to the time of receiving this lot, he had never heard of any change in the method of dealing with them. When he unpacked the parcel, he was much annoyed at seeing the red notice, as he thought they had been sold to him under false pretences. He considered he had a right, under the circumstances, to use them, as he was not bound by anything of which he had no knowledge before he paid his money.

Cross-examined: He could not say how long he was agent for plaintiffs. His brother, who died in 1892, had previously been agent; and on his death, witness continued the business. He had never seen any agreement or terms of agency. He should have sold the mantles without question to anyone who asked for them. At that time he believed the invoice price was 1s. 6d., with 30 per cent. off; but he could not be sure that it was not 2s. 6d., without referring to the invoices. He had none with him, as he had not been asked to produce them. He sent to Mr. Coe because, having ceased to be agent, he did not think the Company would supply him direct. There was an agent of the Company at Ventnor, which was six miles off. He sent there for a burner on one occasion, and had 10 per cent. only allowed him. As he had to pay carriage, it was not worth while doing business on those terms. He could not remember if that was before or after he sent to London for these mantles. One could buy everything in London cheaper than anywhere else; and this was why he sent to Coe. He did not know that Messrs. Hulett were sole agents for London. He obtained his burners from the Helio Incandescent Company, who were bearing part of the costs of the action. He was not their agent. He did not know that they had agents. He bought the burners about the same time as he bought the mantles in question. He had not bought any mantles from the Helio Company. He did not know Huletts were restricted to London, or that plaintiffs appointed sole agents in each district.

Justice WILLS, at the conclusion of the defendant's evidence, said his impression was that he ought to give judgment for the defendant, but without costs, as he was not satisfied about the purchase.

Mr. BOUSFIELD then addressed a short argument to his Lordship; and two or three further questions were put to the defendant, as to the course of business when he was agent for the Company. Counsel also called attention to portions of the evidence on the part of the plaintiffs, in which it was admitted that no notice of the restrictive conditions had been sent direct to the defendant.

Mr. TERRELL, on behalf of the plaintiffs, submitted that the defendant was bound by the conditions which were on the box at the time the goods were purchased by Coe, who must be held to have had notice of them, according to the decisions in cases of railway tickets. Coe was simply defendant's agent, and was told by Huletts that they were only entitled to sell in London and 12 miles round. Coe therefore, on behalf of defendant, made a contract with Messrs. Hulett which he knew they had no right to make. Consequently, there was no contract of leave and licence such as would amount to a defence to the action for infringement brought by plaintiffs. When defendant saw the notice, if he did not like it, he should have repudiated the contract, sent back the goods, and demanded his money. If he kept them, he was bound by the conditions.

Justice WILLS said his judgment must be for the defendant. It was quite true that he bought by his agent; but he (his Lordship) treated the case as if defendant had gone to the shop himself, and then and there paid the money over the counter. Messrs. Hulett had a perfect right to sell in London; and this right was not restricted to people who lived in London. So long as the sale took place within their district, it was good. The defendant, by his agent, went to their shop, and bought the things, which were appropriated to him then and there, and the sale was complete. The fact that they were despatched to a place where he wished them to be sent to could not make any difference, so long as the sale itself was in London. The contract was complete when it was made at the shop; and therefore there was no defect in the sale. If so, the sale of the patent article carried with it the right to use it in any way the purchaser chose, unless he knew of the restrictions. Of course, if he knew of them, and they were brought to his mind at the time he used the article, he was bound by them. On the principle that the patentee had the sole right of selling and using the article, and might prevent anybody dealing with it at all, he had a right to impose his own conditions; and it did not matter how unreasonable or absurd they were. If he said, when the purchaser wished to buy, or a person proposed to take a licence: "I only grant you this licence on this condition," and the purchaser was free either to take it or leave it, if he took it he must be bound by the condition. This was simply common sense, and did not depend upon patent or any particular law But on this sale no condition was brought to the defendant's mind nor did he know of any restriction on the use of these mantles unti he read the label on the box when they came to him. It was said tha he was bound by the conditions; but he (his Lordship) could not agree with that. Defendant had already bought the article subject to no condition; and bringing the condition to his mind after the sale would not do, and ought not to do. It would be most oppressive if any person who bought a thing of this kind were to be bound to find out, before he used it, that it was covered by a label of this kind. Mr. Terrell had said he might have repudiated the sale; and this was quite true. If he found that there was an attempt to impose a condition the non-observance of which would bring litigation upon him, he might say that he would rather not have it, and repudiate the purchase. But he was not bound to do so; and his rights under the existing sale, whatever they were, were not interfered with by reason of his not taking that course. It was said that this case was analogous to those in which there were conditions on the backs of railway tickets, and the like, which imposed liabilities on the persons who took them; but he did not agree with this view. Therefore his judgment must be for the defendant. On the question of costs, he certainly thought that the restriction in dealing with these goods had existed in practice from the outset; and if this had been so, he should have been strongly of opinion that, by sending to London and getting a friend to buy them at Hulett's instead of going to Ventnor, looked very like a trick to get round that known restriction. If this had been so, he should have been as nearly as possible giving judgment for the plaintiffs. But it turned out that he was labouring under a mistake in this respect, and that the whole of the attempt to impose this restriction—a reasonable attempt on the part of the plaintiffs, no doubt, if they could carry it out—had arisen since October last; and he could not see how the defendant, under these circumstances, was likely to have any knowledge of it. Therefore, that difficulty in his way was removed; and he must give judgment for the defendant, with costs.

Thursday, May 2.

(*Before Justices* CHARLES *and* WRIGHT.)

The Corporation of Wolverhampton v. The County Council of Shropshire. The Question of "Extraordinary" Traffic.

This was a special case stated by the Justices of Shropshire, sitting in Petty Sessions at Shifnal, which raised a question as to what constitutes "extraordinary" traffic under section 23 of the Highways, &c., Act Amendment Act, 1878 (41 & 42 Vict., cap. 77). The proceedings before the Justices have already been reported in the JOURNAL (Vol. LXIV., pp. 739, 1170). A complaint had been made against the appellants—he Corporation of Wolverhampton—under the above-mentioned section, charging them with the expenses of "extraordinary" traffic along a certain main road. The facts were these: The road is a main road, passing through an agricultural district. The appellants are the owners of the Cosford Water-Works, about nine miles from Wolverhampton; and, in connection with the pumping-station, they use a large quantity of coal for their engines. This coal has, for a period of 16 years, been conveyed in trucks to a siding of the Great Western Railway Company along the main road. The coal so conveyed was, in the years 1893 and 1894, carried along the main road in carts belonging to them—being driven on all week days; either five or four carts at a time

(each cart being drawn by one horse), following in a string, with only three or two drivers in charge. The average number of journeys per day was five each way. Thus the expenses of labour were economized, and the carts kept the same track; and the wear of the road was not distributed. The quantity of coal conveyed during the year ended March 31, 1894, was 7855 tons or thereabouts. By reason of this traffic, and the frequent daily journeys by a number of carts driven in the same track, the road became much broken up and damaged; and heavy extraordinary expenses had been incurred by the respondents in necessary repairs. The length of the road was about 1 mile 2 furlongs. The extraordinary expenses amounted to £113. The traffic was not in connection with a recognized industry of the neighbourhood, but was purely incidental to the appellants' water undertaking. The Justices came to the conclusion that the traffic was "extraordinary;" and they made an order for £163, the sum determined by arbitration. At the same time, they intimated that they would state a case for appeal.

Mr. BOSANQUET, Q.C., appeared for the appellants; Mr. JELF, Q.C., and Mr. A. GRAHAM represented the respondents.

Mr. BOSANQUET contended that the traffic shown in the case did not amount to "extraordinary" traffic. It had been going on for some sixteen years; and the appellants had merely continued the old traffic. No excessive weight was suggested. The road was a main one, and probably had much traffic; but the case submitted to the Court did not furnish any means of comparing this particular traffic with that of the general public.

Their Lordships, without calling on Counsel for the respondents, dismissed the appeal.

Justice CHARLES said he had come to the conclusion that the traffic described in the case was "extraordinary" traffic, for which the appellants were liable under section 23 of the Highways Act. The leading case on the meaning of the words "extraordinary traffic" was *Hill v. Thomas*, tried in 1892 (2 Q.B., 333). Many cases were cited therein; but it was not necessary to refer to anything beyond the one he had named. It was clear that there must be exceptional user of the road; but it might be the mode of the traffic which was extraordinary. The learned Judge then dealt with the statements in the case; alluding particularly to the string of carts drawn in the same track, which particular mode of traffic began in 1893. The Justices were, at any rate, warranted in finding that the traffic was carried on in a mode which occasioned extraordinary expenses.

Justice WRIGHT concurred.

A Disputed Water-Rate Assessment.

There was a full Bench of Magistrates at the Devonport Petty Sessions on the 24th ult., when Hugh Shannon, of No. 21, Fore Street, Devonport, summoned the Devonport Water Company for having unlawfully, on the 18th ult., turned off the supply of water to his premises, he having complied with the provisions of the Company's Act; and under a second information, for having refused him a supply of water during the time for which the water-rate was tendered, thereby incurring a penalty of £10 and £2 per day for every day during which the supply was withheld. Mr. T. H. Gill, for the Company, took an objection to the manner in which the informations were laid. The first, he said, did not disclose any offence; and the second had not been brought to his knowledge until that morning. The Magistrates decided to hear the evidence; and the complainant was called. He said that for some years he had been supplied with water; and of late there had been a dispute as to the amount of the rental. The Company charged him £3 14s. a year on the assumption that the annual value of the property exceeded £70, which it did not. He tendered £1 14s. for the half-year's supply. This was refused by the collector—the demand being for £1 17s.; and the service was discontinued. He was prepared to pay according to the value of the premises as assessed by the local authorities. Correspondence was put in, in which the Company maintained that the assessment was not excessive, and gave notice that the supply would be discontinued if the amount demanded were not paid. In reply, complainant wrote that he was prepared to pay the rate based on the proper assessment; and he advised the Company that he should sue for damages if the water were cut off. In cross-examination, complainant said he considered the charge should be £2 18s., and 10s. for two closets. At the present time, the Company claimed £7 8s.—two years' water-rate to Jan. 1, 1895. On the application of Mr. Gill, the case was adjourned; it being agreed that the supply should be restored at once without prejudice to either party. On the resumption of the hearing, application was made, on behalf of the Company, that a cross-summons issued by them against the complainant, to have the annual rack-rent or value of his premises determined by two Justices, might be taken first. It was contended that by this means the question whether or not the complainant was fairly assessed might be determined; and the Magistrates assented to this course. Evidence was given that in September, 1886, complainant rebuilt his premises, and up to Dec. 31, 1886, paid a water-rate of £1 per quarter, or on an assessment of the annual value of £8. He had a discussion with the Company, with the result that the rate was reduced to £3 4s. per annum, which was the amount payable where the annual value was from £71 to £80. This amount he paid until June 30, 1893, since which time he had paid nothing. A number of witnesses were called as to the value of the premises, which were said to be worth from £100 to £110 per annum; while, for the defence, evidence was given that the extreme value was £70. For the purpose of the property-tax, they are assessed at £77. The Magistrates found that the assessment was fair and reasonable; and they therefore declined to alter it.

Mansfield Corporation Gas Supply.—The Gas Committee of the Mansfield Corporation have decided, subject to the confirmation of the Council, to reduce the price of gas by 4d. per 1000 cubic feet, making the charges 3s. 5d. for small consumers and 3s. 2d. and 2s. 10d. for larger consumers. In the year ending March last, the improved plant at the works resulted in a saving of £700 in coal alone; while there was also a gratifying increase of £800 in the sale of gas.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Meeting of this Association was held last Thursday, at the Cannon Street Hotel—Sir JULIAN GOLDSMID, Bart., M.P., in the chair.

The SECRETARY (Mr. G. F. Thompson) read the notice calling the meeting, and afterwards the following report of the Directors:—

The present half-yearly ordinary general meeting of the proprietors has been convened in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 31st of December last.

The following summary shows the results of the Association's operations during that period: The quantity of gas made in the half year ended the 31st of December last was 4478 million cubic feet; the quantity made in the corresponding half year of 1893 was 4392 million cubic feet; being an increase of 86 millions, or at the rate of 1·96 per cent. The total number of lights on the 31st of December last amounted to 2,217,569; there being at that date 158,608 consumers on the books of the Association. At the close of the corresponding half year of 1893, the number of lights was 2,135,253, which gives an increase of 82,316, or at the rate of 3·85 per cent. The entire length of mains on the 31st of December last was 1793 miles; the length of mains laid on Dec. 31, 1893, was 1722 miles—an increase of 71 miles.

The Directors have the satisfaction to report that both the receipts for gas and the profit for the half year under review, exhibit an advance upon the corresponding period of last year.

There was a decrease in the cost of coal. The values of tar and ammoniacal liquor improved; but coke again showed a diminution.

The plant and mains were maintained in a due state of efficiency; and the percentage of gas unaccounted for was still further reduced.

The extensive alterations and additions which the Directors have already reported were being made at the Berchem works at Antwerp, have been satisfactorily completed; and the Directors have now decided to discontinue the use of the least important of the three works at that station, and, by concentration of the works, thus further to utilize the land at Berchem, from which they anticipate increased efficiency and considerable economy.

The large tank and gasholder which were in course of erection at the Association's Schoneberg works at Berlin rapidly approached completion; and the remodelling of the principal works at that station in the Gitschiner Strasse was energetically proceeded with.

In order to promote the use of gas among a class which it has hitherto been difficult to reach, and which is the largest consumer of petroleum at the present time, the Directors have recently, at most of their stations, introduced prepayment meters—a system by which they expect that considerable advantage will accrue both to the consumer and the Association.

The Directors have to announce that, after long negotiations, they have arranged an extension of the contract with the Commune of Ixelles, near Brussels, until the year 1924.

A small portion of the Association's remaining land at Marseilles was disposed of during the half year.

The £123,600 4 per cent. debentures, which matured on the 1st of August, were exchanged for a similar amount of 3½ per cent. debenture stock.

The Directors desire, in conclusion, to draw the attention of the proprietors to the accounts for the half year ended the 31st of December last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme, showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended the 31st of December last, and a bonus of 1 per cent., both payable free of income-tax, on and after the 1st day of June next.

The Directors who go out of office by rotation are Arthur Lucas, Esq., C.E., Clarence Pigou, Esq., and the Hon. E. Chandos Leigh, Q.C. These gentlemen are eligible for re-election and offer themselves accordingly. The Auditor who goes out of office by rotation is Joseph Sebag Montefiore, Esq., who is eligible for re-election, and offers himself accordingly.

The CHAIRMAN, in moving the adoption of the report, said he thought they would all agree with him that it was of an eminently satisfactory nature, giving an account of the proceedings of the Association during the past half year, and proving not only the large amount of work that had been done, but also the interesting results of that work. They had gained a great deal by the fact that the price of coal had diminished, and that, apart from coke, the price of residuals had increased. On the other side, however, there had to be borne in mind that the tendency of labour on the Continent—like the tendency of labour in England—was continually and continuously to rise. He was not quite sure that this was an unmixed advantage or disadvantage on the one side or the other; but there was no doubt that of recent years the labouring classes throughout the various countries lighted by their Association had demanded—and not unreasonably—higher wages for the same or for diminished labour. The result, of course, had been—and he believed it would be the result in the future—that they could not help looking forward from time to time to an increased wages bill. Therefore, as he had repeatedly informed them, and as he again pointed out now, the result of their work must depend in the main upon the price of coal. He had often been asked what the future of the coal market was likely to be. At present it was certainly low; and he saw no early prospect of a rise. As far as they were concerned, therefore, he did not for the moment consider the prospect unsatisfactory. But, on the other hand, the question of one of the residuals—coke—always entered into this question; and the price depended upon the severity of the weather. Last winter was—he had been going to say "a cursed winter," as far as the weather was concerned, though it was eminently profitable to gas companies, because throughout the Continent they got rid of their stocks of coke at improved prices. For the sake, however, of ordinary humanity, including himself, who had suffered very much, he really hoped they would not for a long time have to record such a terrible winter again. Then they might, as in former years, have considerable stocks, which they would have to dispose of at lower prices. That had not been the case during the past half year; and the result was the, on the whole, eminently satisfactory report which was now presented to them. They had recorded the renewal, in the course of the half year, of one of their concessions near Brussels. As he had often said before, this was the principal difficulty or labour which the Directors had to discharge—to arrange new

contracts for the Association. The particular contract in question took nearly three years to settle, so the proprietors could understand that the Directors and officers had a very considerable amount of work to get through. The proprietors could not think what a variety of proposals were made, how much discussion *pro* and *con.* consequently took place, and how uncertain they were as to what would be the final form they would arrive at. It therefore required constant vigilance on the part of the Directors in order to safeguard, not only the interests of the shareholders, but even those of the public. On the whole, they had done their best in the service of the Association; and the results were not unsatisfactory. Fortunately, they were able to pay both the dividend and the bonus, because there was a small increase in the net amount of profit. They were all aware that their late excellent Secretary, Mr. Gardiner, who was a man of considerable ability and popularity with the shareholders, had received so favourable an offer from others that he had found it his duty to himself and his family to accept it. The Directors, on behalf of the Association, made a suitable recognition testifying to the value attached by them to Mr. Gardiner's past services. He thought he might also say that they had made arrangements in the office which he believed were entirely satisfactory both to the shareholders and the Directors; and the business of the Association was now as well conducted as it had ever been in the course of his experience. He regretted to say that his experience had now extended over more than 27 years; and he could therefore, perhaps, speak with some authority on the subject. On the whole, their work was admirably organized, and their staff, both on the Continent and in England, was devoted to its duty; and he had no complaint of any kind to make. He believed that there was no body of shareholders better served than were the shareholders of the Imperial Continental Gas Association.

The DEPUTY-CHAIRMAN (Mr. Newton) briefly seconded the motion; remarking that he fully concurred in what the Chairman had said.

The resolution was at once carried unanimously.

The CHAIRMAN then proposed the payment of a dividend of 5 per cent. for the half year ending Dec. 31 last, and a bonus of 1 per cent. on the £3,800,000 stock, free of income-tax.

Mr. HORSLEY PALMER seconded the motion, which was unanimously adopted; and resolutions were afterwards passed re-electing the retiring Directors and Auditor.

On the motion of Mr. P. HARDING, seconded by Mr. HORNCASTLE, a vote of thanks to the Chairman and Directors was passed.

The CHAIRMAN, in reply, remarked that, as he had said at former meetings, one of the sources of the strength of the Board in managing the business of the Association was the constant support they received from the shareholders. Since he had presided over their meetings, and over the deliberations of the Association, he believed there had been practically no difference of opinion, either at the Board or as between the Directors and the shareholders. This was a satisfactory condition of things; and the Board very cordially appreciated the confidence which the proprietors had repeatedly shown in them. He afterwards proposed a vote of thanks to the officers.

The DEPUTY-CHAIRMAN warmly seconded the motion, which was carried unanimously.

The proceedings then terminated.

BOMBAY GAS COMPANY, LIMITED.

The Ordinary Meeting of this Company was held last Thursday, at the Offices, No. 6, Drapers Gardens, Throgmorton Avenue, E.C.—Mr. R. DAVIDSON in the chair.

The SECRETARY (Mr. J. H. Perrins) read the notice calling the meeting; and the annual report and accounts, to which reference was made in the JOURNAL a fortnight since, were presented.

The CHAIRMAN said he thought the report would be considered generally satisfactory by the shareholders. There had been a substantial increase in the receipts for the year, and, on the other hand, a decrease in the expenditure. During the year, the gas and meter rental had risen by £3790. Some 40 additional public lamps had been put up; and there had been an increase of close upon 5 million cubic feet in the private consumption of gas, which was equal to nearly 12 per cent. increase compared with 1893. Coke sales had been slightly less; but this was more than made up by the returns from tar. Interest was £352 more. On the expenditure side of the profit and loss account, the expenditure for coal had diminished by £2100. They had used 356 tons less; and there was a difference in the cost of 2s. 5½d. per ton, owing to lower freights and cheaper coal. Wages had decreased by £370. The items purifying, maintenance of retorts, and trade charges had all increased, as they necessarily fluctuated with extended business. Bad debts were only Rs. 150, which was very little, seeing they had a revenue of Rs. 7,30,000. Exchange showed a very large loss. As the shareholders would see, they had charged £25,132 on this account. This was the difference between the rate of exchange at which the money came home, and 2s. per rupee; it was merely the conversion of rupees into sterling. The whole of the loss on the remittance of the entire net revenue—not on the amount of money brought home—had been charged to profit and loss account. This question of exchange had been a very serious one in the history of the Company. Taking only the past four years, their money came home in 1891 at 1s. 5$\frac{11}{16}$d.; while last year it was 1s. 1$\frac{23}{32}$d. The fall in the exchange had been 4d., less $\frac{1}{32}$d., which was more than 30 per cent. on the revenue. The Engineer and Manager (Mr. Louis Penny) reported the plant to be in good condition, with the exception of one of the gasholders which would have to be renewed in the course of the year; and the Directors had carried £2000 to the reserve for the purpose of partly defraying the cost. With regard to the general revenue account, the dividend paid in June for the second half of 1893 was £8400; and £1404 was brought forward to 1894. The profit for the past year was £16,939; so that deducting the £2000 carried to reserve, and the interim dividend of 3 per cent. paid in December last, they had a balance of £9143 for disposal. The Directors proposed to pay a dividend of 3½ per cent., which would leave £743 to be carried forward. The Chairman concluded by moving the adoption of the report, and the declaration of a dividend of 3½ per cent. (free of income-tax); making, with the interim dividend, 6½ per cent. for the year.

Mr. FREDERIC LANE LINGING seconded the motion, which was carried.

The CHAIRMAN said he had omitted to mention one matter. At the last meeting, he informed the shareholders, that they had renewed the contract for public lighting for one year. They had since been negotiating with the Municipality for a contract for a term of years. Up to the present, the negotiations had proceeded satisfactorily; but the contract had not yet been concluded. The Directors, however, were not without hope that it would be.

Mr. LINGING moved a resolution, which was seconded by Mr. H. E. JONES, re-electing Major W. F. Gordon as a Director; and it was carried. Mr. H. E. Jones was also re-elected, on the proposition of Mr. C. GANDON, seconded by Mr. LINGING.

The Auditors (Messrs. E. A. Flinders and Magnus Ohren) having been re-appointed,

The services of the Chairman and Directors were acknowledged, on the motion of Mr. R. B. FITZMAURICE, seconded by Mr. BEARD.

Mr. OHREN then moved a vote of thanks to the officers. He remarked that the report showed that the staff in Bombay were doing their best for the Company; and he was sure that Mr. Penny would be glad to hear that his labours were appreciated by the shareholders. As one of the Auditors, he could also speak of the excellent manner in which the Secretary and his staff performed their duties.

Mr. CUFF seconded the motion, which was heartily agreed to.

The SECRETARY responded; and the proceedings then terminated.

MANCHESTER CORPORATION GAS SUPPLY.

A Large Expenditure on Water-Gas Plant—The Past Year's Profits.

At the Monthly Meeting of the Manchester City Council last Wednesday—the LORD MAYOR (Alderman A. E. Lloyd) presiding—a statement was made by the Chairman of the Gas Committee (Alderman Gibson) on a proposed installation of water-gas plant.

Alderman GIBSON said the intention of the Committee was to erect carburetted water-gas plant at the Bradford Road Gas-Works, under the supervision of Mr. Corbet Woodall. A building would be constructed large enough for the manufacture of 6 million cubic feet of carburetted water gas daily; but for the present only sufficient machinery would be provided for the production of 3 million cubic feet per day; the cost, it was estimated, being something like £40,000. It might be asked why they wanted this plant. The reason was that they were not able, with their present resources, to make as much gas in one day, during the days when the demand was abnormal, as was consumed. Consequently they had not been able to give to their customers that pressure in the winter time which, in his judgment, the Committee ought to have done. There had never been a time when the Committee were in a better position for supplying their customers than they now were; but they were not in a position to make as much gas as was required for one of the days when the consumption was heaviest. Under these circumstances, the Committee came forward with this proposal. They were not making any experiment. The plan had been tried and found successful at Beckton, Kensal Green, and Belfast; and in engaging Mr. Woodall, who had special experience in the erection of such works, the Committee thought they had acted wisely. In regard to their tar tenders, some information had been given to somebody outside about them. What that information was, he did not know; but it seemed to have caused a considerable amount of uneasiness. He had had a letter from one gentleman who spoke highly of him as "Mr. Gibson," but regarded him in quite an unpleasant light in his capacity of Chairman of the Gas Committee. He replied to that gentleman as he would to anybody else: "If you can put your finger on any irregularity, or on anything of a shady character, point it out." The time had yet to come, he was happy to say, when he could be charged with doing anything shady; and he thought the same remark would apply to every member of the Gas Committee. He begged to assure gentlemen outside the Council who seemed to spend their lives in watching those who were in the Council, that their contracts, all things being equal, were let to the highest bidder. He desired further to inform the Council that the consumption of gas was increasing. A day's consumption last January was 17·2 per cent. more than it was in the corresponding month of last year. In February, it increased by 43·36 per cent.; and in March, it was 30·2 per cent. more. With reference to the result of the past year's working, Alderman Gibson was happy to say that they had had a marvellously successful year, having made a profit of £88,000. Of this sum, about £18,000 was due to the cheap price at which they were able to obtain coal. They had manufactured 130 million cubic feet of gas more than they did last year from the same quantity of coal; and there had been gains in other ways. But for the action of the Council in reducing the price of gas all round, the Committee would have been able to point to a profit of £100,000, which could have gone in reduction of the rates.

Alderman HIGGINBOTTOM seconded the motion, remarking that the Committee were in this position: They must either incur the expense of putting down a new retort-house, or go in for plant such as that now proposed. A new retort-house would cost double the money, and could not be ready for next winter, as the water-gas plant would be.

Alderman THOMPSON was of opinion that the Council made a serious mistake by the resolution passed on Feb. 5, reducing the price of gas to consumers in the out-townships. He maintained that the gas-works belonged to the ratepayers. Consumers were here to-day, and might be gone to-morrow; but the ratepayers remained.

Mr. J. W. SOUTHERN considered that, in a matter of such importance as the spending of £40,000, the Committee ought to have prepared a special report, so that members of the Council might have been put in possession of all the facts and figures. He also submitted that the action of the Committee in engaging an expert like Mr. Woodall justified the position which he took up some time ago, when he appealed to the Committee to appoint a permanent Chief Engineer

of the highest excellence. The fee to be paid to Mr. Woodall for these special services was £1500. His view was that they ought to have a man in the department who could do this work, and not have to go outside, and pay a large sum of money to another person. He desired also to know whether Alderman Gibson's calculation as to the cost of water gas was based on the old price of petroleum, because it had gone up 100 per cent.

Alderman HIGGINBOTTOM, in reply, stated that the petroleum which would be used came from Russia; and its price had undergone little change. It was no reflection on their own staff that they had not the same special knowledge of this work as Mr. Woodall; and it was customary to pay 5 per cent. commission on the total outlay. He did not like the principle, because it offered a temptation to keep up the cost of an undertaking. He therefore arranged with Mr. Woodall that he should receive a lump sum, which was less than 5 per cent. on the estimate; and, in his opinion, they had made a good bargain.

The minutes were passed.

According to the estimates for the current year of the Finance Committee of the Manchester City Council, the Gas Committee propose to pay over to the city fund the sum of £42,055, as against £54,044 last year. The estimated surplus profits for the year 1895-6 amount to £27,055; being largely diminished in consequence of the recent reduction in the price of gas. To make up the sum of £42,055, the Committee propose to add £15,000 from the surplus profits of the past year, which have exceeded the estimate by £34,049. They also intend, for the first time, to pay over to the city fund the surplus profits on the electric lighting account. For the year 1895-6, the profits are estimated at £1823, to which a sum of £5140 is proposed to be added out of the revenue of the past year, making together £6963. The total amount to be paid by the Gas Committee in aid of the rates will therefore be rather more than £49,000.

BOLTON CORPORATION GAS UNDERTAKING.

A Successful Year.

At the Monthly Meeting of the Bolton Town Council last Wednesday, the report on the working of the Gas Department in the past financial year, together with the balance-sheet, was under consideration. A summary of the latter has already appeared in the JOURNAL (p. 909).

Alderman MILES, the Chairman of the Gas Committee, in moving the adoption of their proceedings, which embraced the report and balance-sheet, said the accounts this year were of peculiar interest, inasmuch as the past twelve months had been a "record" period, not only as regarded the profits, but also as to general results. Dealing first with the capital account, he pointed out that it had been depreciated to the extent of £5000 from the reserve fund; but in consequence of the conversion of the gas annuities into Corporation stock at 30 years' purchase, they had been compelled to add £75,084 to that account. This was a matter, however, over which they had no control. The revenue account was, in his opinion, extremely satisfactory in many respects. Coal and cannel had cost £42,163, as against £50,985 last year; and this was one of the reasons for their great success. Rates and taxes had increased £686—a rather large amount, which was, however, accounted for by the fact that a dispute as to assessment which had taken place was now settled; and they were paying up the balance which should, in the natural course, have been paid during the past two or three years. On the income side of the account, they had received as gas-rental £104,055, against £99,837 in the previous year—a gratifying increase of £4218. In the case of coke, there had been a decrease in the receipts, in consequence of the lower price at which they had had to sell it; the present charge being 7s. 6d. in Bolton, whereas in a town only ten miles distant the price obtained was 10s. Tar had brought them £1422 more than last year; but as to sulphate of ammonia, they had received £1270 less by reason of the market being against them. Another heavy item was that of meter-rents, with respect to which they had not received so much as last year by £1737; this circumstance being due to the abolition of meter-rents within the borough. The balance of profit on revenue account was £60,342, as against £51,202, or an increase of £9140. This was disposed of as follows: By capital charge, £22,482; to reserve fund, 2½ per cent., £9210; and special appropriation to reserve fund, £5563. This left a balance of profit to be taken over to the district rate of £23,478, which was equal to a 1s. 2d. rate—a result which he thought would be considered on all hands as exceedingly satisfactory. In addition to the £5000 for the reduction of capital, they still carried forward a handsome balance of £5430 to the credit of the reserve fund, which, he thought, would be an ample reserve for all purposes during the coming year. There would, however, be some heavy work in the form of renewals to engage in this year, such as the building of a new retort-house at Lum Street, and the installation of a stack of retorts on the generator principle at the Gas Street works. After doing all this, they had made a proposal which would trench upon the funds next year to the extent of £6600—viz., the reducing immediately of the price of gas by 2d. per 1000 cubic feet. The gas manufactured last year amounted to 813,805,000 cubic feet, as against 777,363,000 cubic feet in the previous twelve months—being an increase of 4¾ per cent. The quantity of coal used was 79,444 tons, against 76,975 tons—an increase of 4¼ per cent. The cost of coal and cannel was 10s. 7¼d. per ton, as against 13s. 2¾d. The length of mains was now 224 miles 549 yards; and their size ranged from 36 inches to 1½ inches in diameter. They had 8690 gas-stoves, fires, &c., in use, and also 862 prepayment meters, and 139 gas-engines. In concluding, Alderman Miles thanked the Committee for their services, and congratulated all the employees on their success.

Mr. PROCTOR, while complimenting the Chairman upon his statement, said that the capital account was practically goodwill. They had a goodwill of £227,859; and there had been very little of it discharged, although the Corporation had been in possession of the works for upwards of 20 years.

Some discussion took place in regard to the conversion of the gas annuities; and it was explained that, by force of circumstances, the amount had risen from 25 to 30 years' purchase.

The minutes were confirmed.

THE NEW GASHOLDER FOR THE TRADESTON STATION OF THE GLASGOW CORPORATION.

There has of late been much concern among the leading firms of gasholder makers throughout the United Kingdom as to which of them would be successful in securing the contract for the construction of the large holder which the Glasgow Corporation Gas Commissioners some time ago resolved to erect at the Tradeston Gas-Works. It may be remembered that a large number of Scottish gas managers, on the occasion of their late "informal" meeting in Glasgow, had the privilege of seeing the site of the new holder, and the operations going on at the tank in which it is to work (see *ante*, p. 745). Some eight or nine tenders were received for the construction of the holder. Two of them were from Scotch firms—viz., the Barrowfield Iron-Works Company, Limited (formerly Messrs. Laidlaw, Sons, and Caine), of Glasgow, and Messrs. Hanna, Donald, and Wilson, of Paisley. Both of these firms have in past years done a large amount of work for the Glasgow Gas Commissioners; and there was a very general feeling that one of them would put in the successful tender on this occasion. But this was not to be, inasmuch as the tender which was lowest, and has been accepted, was sent in by Messrs. Clayton, Sons, and Co., Limited, of Leeds; its amount being £24,028.

Between the highest and the lowest of the tenders there is stated to have been a difference of somewhere about £8000, more or less; and it is also said of the tenders sent in by the two Scotch firms named, that one of them was fully £3000 above that of Messrs. Clayton; while the other exceeded it by something less than £3000. A Glasgow Town Councillor who is understood to know something about gasholder contracts, says he is confident that the contract in question cannot be satisfactorily carried out for the amount named. This may or may not be so; the best judges in the case are the Leeds contractors themselves. They have already built one large holder for the Glasgow Corporation Gas Commissioners at the Tradeston works; and they have, we believe, put a third lift on one of the large holders at the Dawsholm works.

As mentioned in our report of the proceedings at the "informal" meeting already alluded to, the holder for which the contract has now been placed is to have a capacity of about 5 million cubic feet. It is to be of the three-lift type, each lift being 45 feet in height; and the tank is to be 46 feet deep and 220 feet in diameter. The holder will be supported by 24 steel latticed standards, which will be carried up full height, and be tied and braced by girders and diagonal bars.

It was at one time thought that this holder and its tank would cost some £45,000 to £48,000, or even more; but the two tenders which have been accepted show that the whole outlay will be less than £40,000—so low in price have the materials of construction and labour fallen in the present year.

WIGAN CORPORATION GAS SUPPLY.

Reduction in Price—Disposal of the Profits—The Make of Gas.

At the Monthly Meeting of the Wigan County Borough Council last Wednesday, a statement was made by the Chairman of the Gas and Electric Lighting Committee (Mr. C. B. Holmes) concerning the above-mentioned matters.

Mr. HOLMES, in moving the adoption of the minutes of the Committee, said it would be remembered that in December, 1893, the price of gas was raised 3d. per 1000 cubic feet, to meet the great demand on the borough exchequer in the following year. At that time, the price was advanced until March 31, 1895. This period had now expired; and as the Council would see from the minutes of the Committee, they had unanimously resolved that to all consumers outside the mile radius from the gas-works the price of gas for illuminating purposes only should be reduced by 3d. to 3s. 6d. per 1000 feet; and to those within the borough and the mile radius, it should be decreased by 1d. to 3s. 2d. The price charged for heating and cooking and for motive power was to remain at 2s. 3d., with the usual discount. The object, of course, in reducing the price was to carry out as far as they could the arrangement entered into some sixteen months ago; and while they were doing this they were testifying to the out-townships, and likewise to the Council and the ratepayers, that they were endeavouring to the utmost in their power to reduce the price of gas consistently with keeping down the district rate as far as possible. The diminution in the price of gas would entail a loss on the exchequer of about £1550; but the Committee hoped to recoup themselves by a reduction they expected to obtain in the price of coal and cannel, and by an advance in the value of the residuals. They proposed to hand over this year in relief of the general district rate the sum of £10,500. This, he was sure, must be satisfactory to all, and to none, he thought, more than to members of the Committee. They found that the Gas Engineer (Mr. Jos. Timmins) had even eclipsed himself this year in the make of gas. In the previous year they obtained the very high figures of 11,500 cubic feet of gas for every ton of coal and cannel carbonized. This year the figures were higher; the make being, without exception, the highest possible amount of gas which had been produced of which they could find any note in the published accounts of gas manufacture pure and unadulterated—he meant gas purely from coal and cannel. It was the highest rate that had ever been produced before in the annals of gas making; and it was a great credit to their Engineer that he had raised his production of gas over other managers, very many of whom came far below 10,000 cubic feet per ton.

Alderman GEE, in seconding the motion, said they had in their Gas Engineer one of the best in the country. His make of gas exceeded all others; and his quality was always up to the standard.

The motion was adopted.

Sale of Shares.—A small number of fully-paid £10 shares in the *Matlock and District Gas Company, Limited*, changed hands last week at £20 2s. 6d. apiece.

THE BURTON-UPON-TRENT GAS AND ELECTRIC LIGHT UNDERTAKINGS.

Profit on Gas—Loss on Electric Lighting.

At the Meeting of the Burton-upon-Trent Town Council last Wednesday, the minutes of the Gas and Electric Light Committee were presented, and their adoption was moved by Alderman Lowe. He remarked that he was very glad to report to the Council that the balance-sheet of the gas undertaking had been made up, and turned out very satisfactory. Last year was the most unsatisfactory one in the history of the works since they had been in the hands of the Corporation; by far the smallest profit being then made. This year, however, the very opposite had taken place; the largest profit on record having been realized. The result of the year's working showed a gross profit of £16,081 (representing about 11 per cent. on the capital outlay), against £8471 in the previous year—an increase of £7610. After providing for interest on, and the annual repayments of loans, amounting to £5926, and again transferring the sum of £300 to the deterioration fund, the actual net profit amounted to £9855, as compared with £2189 last year—an increase of £7666. The past year's working showed the largest surplus in the history of the undertaking. The total income had been £45,437, against £38,469 in 1893-4—an increase of £6968. The amount derived from the sale of gas showed an increase of £5466, of which about £3300 was due to the higher price; while the consumption had risen by 14¾ million cubic feet. The residual products fetched more by £82 than in the previous year. The net income from the manufacture of sulphate of ammonia amounted to £2494; but the value of ammoniacal liquor used during the year should be set off against this sum to arrive at the actual profit. This was a matter upon which they might be congratulated. Previously they used to sell their liquor; but being advised to manufacture it into sulphate of ammonia, they did so, and the first full year they had made thereby a profit of £800 on a capital outlay of £1979. He thought this was an exceedingly satisfactory result. The total expenditure for the year had been £35,581—a decrease of £1191. Coal had cost £2098 less; but, on the other hand, the renewals of retorts, mains and services, and meters had cost £675 more. This was practically accounted for by the costs *re* Allsopps' claim. The amount expended during the year on capital account had been £1393; bringing the total outlay to date up to £146,369. The amount now standing to the credit of the loan capital account was £4341; and the amount of loans outstanding on the undertaking was £64,946. The reserve fund account was now £8924, against £4200; and the deterioration fund account stood at £8400. He was bound to say he did not think that this sum was a penny too much for the reserve fund; for they knew not what differences or disputes might hereafter arise, and it was wise to be prepared against any such contingency. He found some years ago, that the reserve fund was a trifle below £30,000; but this was too much—about £10,000 being a reasonable sum to keep in reserve. The profits had largely depended on the increased consumption of gas and the temporary increase in price. He was sorry to say there had been a loss on the electric lighting of upwards of £1800; but they hoped to have better results another year in this department. As to the price of gas, it would be a matter for the consideration of the Council whether the price could be lowered, if profits went up and the price of coal did not increase. Mr. Turner, in seconding the motion, agreed that all concerned were to be congratulated on so successful a year's operations at the gas-works; and he remarked what a good thing it would be if every department of the Corporation paid as well. Mr. Rugg expressed a similar opinion, and pointed out that it was simply through the unsatisfactory state of the coal trade that the 3d. per 1000 cubic feet was put on the price of gas. This had since been taken off, and now the price stood at 2s. 9d.; but he hoped the Committee would see their way to reduce it to 2s. 6d. The minutes were then passed.

ELECTRIC LIGHTING NOTES.

The revenue account of the Huddersfield Corporation Electricity Department shows a deficiency of £2065 to be provided for in the borough rate for the year ending March 31, 1896. Mr. Gee, at the last meeting of the Council, called attention to the financial position of the department by asking the Chairman of the Electricity Committee if he could give them any idea when this "leakage" (as he facetiously put it) was likely to stop. The deficit was, he added, a few hundreds more than in the preceding year. Mr. Calvert's reply was not very cheering. He said there "appeared" to be a deficit; but the fact was they were in a much better position than in the previous year, when the deficiency was about £2500 for only part of a year. He pointed out that they were obliged to pay off their loans in fifteen years; and but for that and the sinking fund, they would have made a profit of £1380. He could not say when they would become a paying concern. The Committee had thought of asking the Finance Committee not only to raise additional money, but to devise some means whereby they would be able to have a longer time for repayment. Mr. Brearley elicited from Mr. Calvert that Longwood would have to pay its share of the deficit; but he hoped that "some day" they would participate in the benefit of the system.

A Local Government Board inquiry has been held at Worcester, by Mr. F. H. Tulloch, M.Inst.C.E., in respect of the application of the City Council for sanction to borrow £20,230 for purposes of electric lighting. It was explained by the Town Clerk (Mr. S. Southall) that in August, 1893, the Local Government Board granted the application of the Corporation for permission to borrow £39,109 for electric lighting purposes. This loan was intended to cover three items: Purchase of land, £5000; erection of generating station, £11,000; and generating plant and some mains in the city, £23,109. The Council last year applied for a further £1861, for street lighting; and this was sanctioned. As regarded the generating-station, the Council in the first place understood that the building would cost about £10,000; but the contract amounted to £14,797—leaving an excess of £3797 over the £11,000 applied for. The City Engineer (Mr. T. Caink) stated that the plans had not been got out in detail when the estimate was given. A list of extra and additional works to the amount of £4166 and other matters were explained. There was no opposition.

The Special Lighting Committee of the Liverpool City Council have practically determined to acquire the Electric Supply Company's undertaking at the price of £400,000. But before entering into any agreement, the members of the Committee have decided to engage an expert to prepare and submit a valuation of the plant, machinery, and other property, and to instruct the City Auditor to ascertain the financial condition of the Company.

A recommendation was before the York City Council yesterday week, that a scheme of electric lighting submitted by the Electrical Construction Company, of Wolverhampton, be adopted; and that the tender for plant and fittings for £10,865 should be accepted, subject to powers being granted for a loan for the execution of the works. The City Surveyor (Mr. Creer) had reported that the low-tension three-wire system would be best for the city. Eventually the recommendation was referred back to the Committee making it, with a request that the total cost of the entire plant, buildings, and land be given, and also a report upon the various works visited, and asking them to request Professor Kennedy to state definitely whether or not he agreed with the advice given to the Council by Mr. Creer.

Further discussion on the question of the purchase of the Liverpool Electric Supply Company's undertaking took place at the meeting of the Corporation Lighting Committee yesterday week. The purchase is stated to be contingent on the extension of the city boundaries being carried out, as a portion of the Company's plant is situated both within and outside the present boundaries.

The Board of Trade report on the St. Pancras electric light box explosions was formally presented to the Vestry at last Wednesday's meeting. Even with this direct evidence of the presence and effect of the alkaline deposit on their own insulators, the Vestry decided to approach the President of the Board, and inform him that they are of opinion that "parliamentary powers should be obtained, giving to the Board, or to some independent authority, a control over gas companies, similar to that which is exercised by the Board over electric lighting companies, so that they may be compelled both to lay new mains, and to keep their existing mains in such a condition as to effectually prevent any escape of gas from them." That the Vestry acknowledge their own responsibility in the matter of the explosions is proved by their Committee's statement that they "have already anticipated some of the requirements suggested in the report of the Board of Trade, and the work in connection therewith is now being proceeded with." The Committee have further to consider the report; and they will again report to the Vestry on the subject. It will be remembered that these requirements stated that the pattern of the present faulty insulators should be changed, and that means should be provided by which all the conduits can be inspected throughout their whole length. When these little jobs are finished, the "profit" on last year's working will be more than absorbed. The combined dust-destructor and central station in the King's Road, of which so much is expected, are being rapidly proceeded with. A letter was read from the London County Council waiving their objection to lend the Vestry a further £15,000 at 3¾ per cent. for a term of 42 years, though nine months ago a shorter term of 20 years was stipulated. This item completes the £100,000 sanctioned for electric lighting.

The Electric Lighting Committee informed the Oldham Town Council last Wednesday that Professor Kennedy had estimated the cost of carrying out necessary additions to the electric lighting plant at £10,000. It was explained that the original estimate for the works was £27,000, of which £25,550 had been expended. There had, however, been so many applications for the electric light that the Corporation had not the power required for the work; and it had also become necessary to extend the cables.

The Derby Town Council last Wednesday gave the Electric Lighting Committee permission to apply to the Local Government Board for sanction to borrow £5000 for electric lighting purposes. It was stated by Alderman Leech that the business was in a thriving condition, and that he expected to be shortly in a position to present a satisfactory balance-sheet.

A Local Government Board inquiry has been held at Hanley respecting an application made by the Corporation for sanction to borrow £5000 for the extension of their electric light installation. Since the application was made, the Corporation have authorized the Town Clerk (Mr. A. Challinor) to ask for permission to raise a further loan of £20,000. At the inquiry, the Town Clerk invited the Inspector (Mr. R. Walton) to consider the second application with the first; but Mr. Walton replied that he was limited to the terms of the notice, though the matter could be mentioned incidentally. Details respecting the extensions were given, after which the Inspector said he did not know whether the Local Government Board would be satisfied with regard to the loan of £20,000 without further inquiry, but the information he had received should be laid before them.

During the erection of a chapel recently not twenty miles from Manchester, no small amount of discussion took place as to the best means of lighting the building. Finally the electric light was decided upon; and, in due course, the necessary plant was put down—gas being the motive power, but being otherwise entirely discarded. The opening day arrived; and at the evening service the light was used. The minister had just commenced his discourse when the place was suddenly plunged in complete darkness. The minister, almost at a loss what to do, and expecting the light to appear every moment, at last asked the organist to strike up some well-known hymn, so that the congregation might sing until the light reappeared. The organist—evidently making sure of falling in with the request to the letter—quite unconsciously, began to play "Lead, Kindly Light," which, it need hardly be stated, caused a titter all round. After some five or six minutes, the light reappeared; and the service concluded without further hitch. The correspondent who has forwarded to us the foregoing particulars adds: "At the next service, it was noticed that two gas-brackets had been fixed in front of the organ—without further discussion as to their being necessary."

EXHIBITIONS OF GAS APPLIANCES.

An interesting exhibition of appliances for cooking and trade purposes has recently been held at Southampton. Messrs. Fletcher, Russell, and Co., Limited, supplied the bulk of the gas appliances; and one of the local exhibitors showed the incandescent gas-light. The opening ceremony was performed by Mr. R. C. Hankinson, the Chairman of the Gas Company. In the course of some appropriate remarks, he stated that Mr. J. Sharp, the former Manager of the Company, had taken a great interest in exhibitions of this kind, and had travelled the country 58 years ago in the interests of the gas industry. He read a testimonial from "The Greenman, Royston," dated Aug. 4, 1837, in which the efficiency of the then existing gas appliances was extolled; and, proceeding, he mentioned that whereas in 1886 the Company had only 23 gas-stoves out on hire, there were now something like 800 distributed over Southampton. Miss Helen Edden delivered cookery lectures during the course of the exhibition. Messrs. Fletcher, Russell, and Co. have also been exhibiting at Yarmouth; and, in addition to their goods, the "Vertmarche" high-power gas-lamp and the incandescent gas-light were on view. The cookery demonstrations were confided to Miss Ada Wardrop. Messrs. C. Wilson and Son have been exhibiting specimens of their manufacture at Sowerby Bridge; being assisted in proving the usefulness of gas in cooking by Miss Holroyd. The formal opening was performed by Mr. W. Wilson, a member of the District Council, who, in a short address, stated that gas was introduced into the town about 50 years since. The old Local Board bought the gas-works from the Gas Company in 1861, when the consumption of gas was 12 million cubic feet; and the price, 5s. per 1000 feet. In 1881 the consumption was 42 millions; and the price had been reduced to 3s. 9d. In 1894, the consumption was above 80 millions; and the price was 2s. 6d., with a discount of 10 per cent. to all, and 15 per cent. to large consumers. The average increase since 1881 had been 3 million cubic feet; but last year they exceeded anything that had been done previously, the increase being 7 millions. In consequence of the growing consumption they had been compelled to provide greater storage capacity, as well as prepare for laying larger mains. Last Wednesday an exhibition of gas appliances manufactured by Messrs. Fletcher, Russell, and Co., Limited, was opened at the Old Corn Exchange, Rochester. Free lectures on cookery, with practical demonstrations, were given by Miss Helen Edden. The exhibition attracted considerable interest, and remained open for four days. The exhibition of gas appliances at the Corn Exchange, Coventry, which was opened on the 23rd ult., closed last Thursday. Large numbers of visitors attended, and the cookery lectures of Miss A. Wilkinson were attentively listened to. The exhibits included not only appliances directly connected with gas cooking, lighting, and heating, but allied commodities. Mr. Andrews, the Chairman of the Gas Committee of the Coventry Corporation, performed the closing ceremony. From personal experience, he strongly recommended the use of gas for cooking purposes, as it was, he said, much cheaper than coal. The number of gas cooking-stoves let out on hire by the Corporation was about 1300, and about 150 for heating; and the numbers were steadily increasing. A very attractive exhibition of gas appliances was opened at the Prince of Wales's Rooms, St. Heliers, on Monday evening last week, by the Jersey Gas Company; the exhibits being furnished by Messrs. Fletcher, Russell, and Co., Limited. The room was crowded with a highly intelligent as well as appreciative audience, who not only had the advantage of listening to a most able discourse on the art of cooking, delivered with vivacity and attractiveness by Miss Rose Brown, but were able also to take serviceable lessons from the practical manner in which she illustrated her work. She was introduced by the Gas Company's Engineer and Secretary (Mr. J. Morris), who explained that the one great effort of the Company was to economize all they could, and they were desirous that the public should follow their example. For this reason, and for the public benefit, it was that it had been decided to hold the exhibition, so as to practically demonstrate the perfection which the art of cooking by gas had attained. Messrs. C. Wilson and Son were exhibiting at Darlington last week, with the aid of Mrs. C. F. Pitcher as the cookery demonstrator. During the past week, the Davis Gas-Stove Company, Limited, held highly successful exhibitions at Bristol, Stanmore, and Tunbridge Wells. At the first-named place they had the assistance of Miss A. A. Hunt; at Stanmore, of Mrs. Springthorpe; and at Tunbridge Wells, of Miss B. Cameron. An exhibition was held in Brechin, from Wednesday to Friday last week, under the auspices of the Brechin Gas Company. It was opened by Mr. J. Guthrie, J.P., the Chairman of the Company; and Miss Burdon was the lecturer.

METROPOLIS WATER SUPPLY.

The Quality of the Water during the Month of March.

The returns furnished to the Registrar-General by the London Water Companies as to the water supply of the Metropolis during the month of March, show that the average daily supply amounted to 229,272,068 gallons, as compared with 185,463,942 gallons in the corresponding month of 1894. The number of services being 813,528, the rate was 282 gallons to each service. Of the entire bulk of water sent out, 112,562,290 gallons were drawn from the Thames, and 116,709,778 gallons from the Lea and other sources. Reporting upon the quality of the supply, Dr. E. Frankland said: Taking the average amount of organic impurity in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies and by the Tottenham Local Board of Health was: Kent, 0·7; Tottenham, 1·3; East London (deep well), 1·5; New River, 1·6; Chelsea, 2·1; Colne Valley, 2·2; West Middlesex, 2·8; Grand Junction, 3·1; East London (river supply), 3·3; Southwark, 3·9; and Lambeth, 4·1. The unfiltered river water contained the following proportions: Thames at Hampton, 4·8; New River Cut, 3·3; and the Lea at Angel Road, 5·1. The Thames at Hampton was, on March 11, turbid and yellow in colour. It was below its average chemical, and of very bad bacterial, quality. Storage for periods varying from 6 to 14·7 days reduced the number of bacteria to a maximum of less than 1-6th and a minimum of less than 1-20th of the original amount. As delivered by the five Companies drawing from this river, it was in every case efficiently filtered and improved in chemical quality. The bacterial improvement effected by the various Companies is expressed by the following percentage numbers: Chelsea, 99·78; West Middlesex, 99·19; Southwark, (No. 4 filter well) 99·84, (No. 8 filter well) 99·53; Grand Junction, (general well at Hampton) 97·28, (general well at Kew Bridge) 99·4; and Lambeth, 99·31. The New River Cut, before entering the subsidence and storage reservoirs, was, on March 13, turbid and pale yellow in colour. It was of good chemical, but inferior bacterial, quality. Even after passing the storage reservoirs, it still contained upwards of 6000 bacteria per cubic centimetre. After filtration, the New River Company delivered it in a clear, bright, and colourless condition, and improved it bacterially to the extent represented by the following percentage numbers: General filter well, 99·29; No. 2 filter well, 99·53; and No. 8 filter well, 95·83. The water taken from the Lea at Angel Road by the East London Company was, on March 13, turbid and yellow. Both in chemical and bacterial quality, it was inferior to the Thames at Hampton two days previously. Even after storage for fifteen days, it still contained a large number of bacteria; but it was efficiently filtered before delivery, and much improved in chemical quality. The bacterial improvement is expressed by the following percentage numbers: No. 1 Essex well, 99·45; No. 2 Essex well, 99·05; Middlesex well, 97·04; and No. 12 filter-bed, 99·68. The deep-well waters of the Kent and East London Companies, and of the Tottenham Local Board of Health, possessed a high degree of organic purity, and were of excellent quality for dietetic purposes. The Tottenham water was, however, very slightly turbid. The Colne Valley Company's water contained more organic matter than usual, but this was of vegetable origin; and in other respects the water was of excellent quality. It was softened before delivery; and thus rendered suitable for washing. Seen through a stratum 2 feet deep, the New River, Kent, and East London (deep-well) waters were clear and colourless; the Colne Valley, clear and nearly colourless; the Tottenham, very slightly turbid and colourless; the East London (river supply), clear and pale yellow; and the remaining waters, clear and very pale yellow. The bacterioscopic examination of the raw river waters before and after storage, and of the supplies of the various Companies collected on the 11th, 13th, and 14th of March, furnished the results contained in the following table:—

Description.	No. of Microbes per Cubic Centimetre.	Temperature in Deg. C.
Raw, Stored, and Gravel River Waters.		
Thames at Hampton	36,560	5·5
„ after storage for 14·7 days (Chelsea Company)	5,400	3·7
„ after storage for 6 days (Lambeth Company)	3,000	—
„ after storage for 6·3 days (West Middlesex Company)	1,620	4·3
Grand Junction Company's unfiltered water (arriving from Hampton) at Kew Bridge	4,700	—
New River Cut before entering reservoirs	11,800	8·0
„ „ after storage, but before filtration	6,560	6·3
River Lea at Angel Road	40,800	6·2
„ after storage for 15 days (East London Company)	17,160	4·4
Southwark Company's gravel water	120	3·9
Filtered River Water as Supplied.		
Thames—		
Chelsea, general filter well	80	2·8
West Middlesex, general filter well	296	4·2
Southwark, No. 4 filter well	60	4·9
„ No. 8 filter well	172	5·0
Grand Junction, general filter well at Hampton	996	5·2
Grand Junction, general filter well at Kew Bridge	220	5·4
Lambeth, general filter well	252	4·4
Lea—		
New River, general filter well	84	5·7
„ No. 2 filter well	56	5·7
„ No. 8 „	492	5·7
East London, No. 1 Essex well	224	4·0
„ No. 2 „	388	3·7
„ Middlesex well	1,208	3·7
„ No. 12 bed	132	4·5
Deep well—		
Kent, new well at Deptford	8	11·3

From this table, it is evident that the effects of the recent very low temperatures had not disappeared in the case of the raw waters; while several of the filtered waters also still contained an abnormal number of microbes. The water pumped from the gravel, however, was of remarkably good bacterial quality.

In their report to the Official Water Examiner (Major-General A. de Courcy Scott, R.E.) on the composition and quality of the water supplied to London during March, as ascertained by tests of samples taken at various times and places on behalf of the Water Companies, Messrs. Crookes and Dewar say: Of the 167 samples examined, four were recorded as "clear but dull;" the remainder were clear, bright, and well filtered. With the improved meteorological conditions, the London waters are approaching a state of considerable purity. In our report for the month of March last year, we commented on the then excellent quality of the waters, and said that they were "rapidly approaching their high summer standard." The following comparison between the past month's supply and that of March, 1894, will show

that the former high degree of analytical purity has been more than maintained:—

	Common Salt per Gallon.	Nitric Acid per Gallon.	Hardness Degrees.	Oxygen required per Gallon.	Organic Carbon per Gallon.	Colour. Brown : Blue.
March, 1894	2·285	1·101	15·32	0·052	0·121	21·3 : 20
„ 1895	2·130	0·937	15·12	0·043	0·117	18·2 : 20

Note.—The above figures are all means.

Bacteriological examinations were continued throughout the month; the process adopted being identical, as regards culture medium, time of incubation, and temperature, with that we have all along pursued, in order that our results may be strictly comparable with each other at all times of the year. The filtered waters from the general wells at the works had an average of 41 microbes per cubic centimetre; the unfiltered water containing 9236 microbes per cubic centimetre. The rainfall at Oxford during March was very near the 25 years' mean, which is 1·59 inches. The actual fall was 1·46; showing a deficiency of only 0·13 inch.

THE LONDON COUNTY COUNCIL AND THE WATER COMPANIES' UNDERTAKINGS.

Petitions Against the Transfer Bills.

The Hybrid Committee to whom have been referred the Lambeth and the Southwark and Vauxhall Water (Transfer) Bills of the London County Council, and the Bills of the Lambeth and Chelsea Water Companies, commenced their sittings yesterday. As already mentioned, a large number of petitions will come before the Committee—among them, of course, being one from the Lambeth Company—against the Council's proposals. The petitioners state that the district within which they are authorized to supply water has an area of about 100 square miles; and of the area of about 71 square miles actually supplied, nearly two-thirds is outside the jurisdiction of the London County Council. They submit that the water supplied by them for domestic purposes is, and has been for many years past, good in quality and ample in quantity, and that in all other respects the Company have faithfully and efficiently discharged their duty. They are persuaded that no adequate or satisfactory reason can be shown at the present time for asking Parliament to sanction the compulsory acquisition by the Council, or any other public body, of the undertaking of the Company. They submit that the question of the purchase of all the undertakings as a whole and at one time, and upon consistent principles, should be the first question for Parliament to decide. If, however, Parliament sees fit to sanction the compulsory transfer of the Company's undertaking, the petitioners can see no good reason why it should be purchased under the Lands Clauses Acts. If any instructions are given to the Arbitrators, the petitioners submit that they should include not only directions that the value of the undertaking should be taken at the time of making the award, with an addition for compulsory purchase, but that the Company should be adequately compensated in respect of their powers to make up back dividends, and for the loss they would sustain through being prevented from realizing their prospective value. The petition which has been presented by the Middlesex County Council, praying to be heard against the Water Bills of the Council, states that, while they do not express any opinion as to the expediency of vesting the water supply of London itself in the Council, or any other central Water Authority, they entirely object to any scheme which would place any part of the county of Middlesex under the control either of the Council or of any other authority representing the inhabitants, ratepayers, or water consumers of London, as distinct from, or in combination with, those of Middlesex. They submit that the effect of the Bills as they now stand will be to place a large part of the county of Middlesex under the control, for the purposes of the water supply, of a body on which they are not represented, and whose interests differ materially from, and are in some respects antagonistic to, those of the water consumers of Middlesex.

Gas Discounts at Todmorden.—Mr. W. Crossley moved, at the last meeting of the Todmorden District Council, that a discount of 5 per cent. be allowed off all gas accounts of £20 and under. From his remarks, it appeared that at the present time a discount of 5 per cent. was granted on accounts of from £10 to £20; so that his resolution would only affect accounts under £10. Poor consumers, he said, were allowed no discount; whereas some of the rich consumers received 12½ per cent. It was true something had been done not only for the poor, but the rich as well, in the reduction of meter-rents and the price of gas. He did not object to this so long as they could afford it; but he thought the first thing the Gas Committee ought to have done on purchasing the gas-works was to place everybody on the same level. He found that during 1894 they received for gas £10,985; and if they took 5 per cent. off this, it would only represent £549. But there were consumers who obtained 7½, 10, and 12½ per cent. The Clerk, in reply to questions, stated that the discounts which they were allowed to make under the Act were: For accounts of £1 and under £10, 2½ per cent.; £10 and under £20, 5 per cent.; £20 and under £30, 7½ per cent.; £30 and under £40, 10 per cent.; £40 and upwards, 12½ per cent. If Mr. Crossley's motion was carried, the probability was that, in the present state of the finances of the gas undertaking, there would be a surcharge of the members who voted for the resolution; and if such a surcharge should take place, there was not the slightest hope of its being remitted. Mr. Greenwood said that, in the present alarming condition of the gas undertaking, he did not care to second the motion. The condition of the department, to his mind, was so unsatisfactory that he should like to ask for a return of the cost of the acquisition of the works, with a detailed statement as to the value of the assets purchased, and the amount paid for them. He was afraid there would be a deficiency next year, as the production of gas was costing 3d. per 1000 cubic feet more than it did formerly. Mr. Jackson protested against Mr. Greenwood's "one-sided and incorrect" statement; and the matter was allowed to drop.

THE METROPOLITAN WATER COMPANIES AND THE FROST.

Local Government Board Inquiries.

Major-General A. de Courcy Scott, R.E., continued, on the 19th ult., his investigation into the complaints made to the Local Government Board respecting the deficient supply of water, in consequence of the recent severe frost, in the district of the Southwark and Vauxhall Water-Works Company. Two memorials were considered—the first of which had emanated from Mr. B. Hemming and others, residents in the vicinity of East Hill, Wandsworth. They complained that they received no water in their cisterns for a period approaching two months; and they viewed with alarm the indifference of the Company to remedy this state of things. Water had been running to waste in the gutters for a very long time, owing to the bursting of the pipes, which were laid at such a shallow depth that "a frost had influence over them." They also viewed with alarm the insanitary consequences that would probably arise; and they prayed the President of the Local Government Board to put the pressure at his command on the Water Company to induce them "to awake from their slumbers, and cause the water to flow into the cisterns." The memorialists also suggested that, if the present powers of the Board were not sufficient "to guard peaceable citizens from a repetition of this defective administration of a great monopoly," he should lay before Parliament a Bill to confer powers on the Department to control, by fine, a further repetition of such defective administration. The second memorial had been presented by a Mr. F. W. London and other householders in the Haldon Road, West Hill, Wandsworth; and it urged the Local Government Board to exercise the powers vested in them to compel the Company to relay their mains to the depth of at least 2 ft. 6 in.—their present depth being not more than 1 ft. 3 in. The petitioners asserted that they had suffered inconvenience for two months, which still continued at the date of the memorial (March 25).

Mr. W. B. Tanner, Solicitor, and Mr. J. W. Restler, M.Inst.C.E., the Engineer, appeared for the Company; Mr. W. W. Young and Mr. H. G. Hills, for the Wandsworth District Board of Works; and Mr. E. Tanner represented the London County Council.

Mr. *Hemming* was the first witness called; and he stated that his supply had been interrupted between Jan. 27 and April 17; and from Jan. 31 to March 30, he was absolutely without water in his cisterns. During the frost the Company provided him with no water; and he had to obtain a supply from a stand-pipe 200 yards away.

In reply to Mr. Tanner, witness admitted that he did not have his communication-pipe examined between Jan. 31 and March 30; and it might have been frozen during that time.

Surgeon-Major *Mark Robinson* stated that he lost the supply to his private residence between Feb. 13 and 27; he had to obtain water from a stand-pipe 150 yards away. Many people had still to fetch water from that stand-pipe. He had a much more serious complaint to make against the Company in respect of a laundry business (of which he was part owner) in the Putney Bridge Road. They were without water at that place from Feb. 11 to March 11; and they required 2000 gallons a day. They had a stand-pipe at a distance of about 100 yards for two or three days. But the main became frozen; and they had then to go a quarter of a mile for water, entailing an expense of about £30. The mains in the Putney Bridge Road were not more than 18 inches from the surface. Questioned as to the communication-pipe to his private house, witness said he did not know whether it was frozen between the stopcock and the main.

Mr. *G. Hill* gave similar evidence; and, in reply to the Inspector, he mentioned that there were two mains in his road—one 3 feet deep, and the other (a 4-inch pipe) only 19 inches. The former burst, but the latter did not.

Mr. *R. Lane* stated that the depth of the main opposite his house was 2 ft. 1 in. or 2 ft. 2 in.; while Dr. *Wilkes* said it was about 18 inches.

Mr. Tanner remarked that most of the witnesses were supplied from the same main; and it was not frozen. Therefore it was simply a question of the service-pipes.

The Commissioner: There is a question as to the insufficient pressure at the period of the thaw.

Mr. Tanner: That is accounted for by the repairs that were going on elsewhere.

The Commissioner: Several witnesses suggest that the supply was intermittent during the thaw.

Mr. Restler: That is not owing to the insufficient pressure, but to the shutting down of the main for repairing the communication-pipes in these particular cases.

Mr. *F. W. London* and other witnesses were then called in support of the second memorial. Mr. London stated that he was without water from Jan. 28 to April 11; and he complained of the distance of the stand-pipe, and of the inadequate service by water-carts.

Mr. *Peter Dodd*, one of the Surveyors of the parish of Wandsworth, submitted particulars of the depths of mains and communication-pipes at nearly all the memorialists' houses. He then proceeded to say that there were six bursts of the main in one road in about 120 yards. The old main was only 12 inches deep; and the new main was laid at a depth of 2 ft. 3 in.

Mr. Tanner observed that it was quite true that the main was relaid; but there was only one burst.

Witness stated that he had seen the broken mains, and the water bursting up in the road in six places.

Mr. Restler remarked that the old main was 1 ft. 3 in. deep; and a new one was laid at a depth of 2 ft. 2 in. The pipes seen by witness were broken in pulling them out of the ground.

The Commissioner suggested that the surveyors and someone from the Water Company should agree upon as many of the facts as possible previous to coming before him.

This was assented to by both parties; and the inquiry was adjourned.

The further hearing of the memorials against the Lambeth Water Company was proceeded with at the Wandsworth District Board Offices on the 25th ult.

Mr. E. Tanner represented the London County Council; Messrs.

W. W. YOUNG and Mr. H. G. HILLS, the Wandsworth District Board of Works; and Mr. BODKIN, Mr. HARRY WILKINS (Secretary), Mr. MAY, and Mr. T. F. PARKES (Engineer) appeared for the Company.

Mr. BODKIN said that, on the first day's proceedings (see *ante*, p. 808), the Commissioner reserved all technical questions which the Lambeth Company might think fit to raise in this inquiry. Those questions had been amended and dealt with in the shape of a letter, which he now handed in. Then the Company had also prepared a statement with reference generally to the memorial purporting to be made under the 9th section of the Metropolis Water Act, 1852.

The following are the principal portions of the statement referred to, which is signed by the Secretary:—

"Of the mains supplying the 54 roads mentioned in the memorials, 20 were found, after the cessation of the frost, to be burst. Their length varied from 3 to 531 yards; their diameter, from 3 to 5 inches; their depth below the ground, from 1 ft. 3 in. to 2 ft. 7 in.; and they had been laid for periods ranging from 20 to 50 years—the greater part for 30 years. The total length of the 20 mains is 2249 yards; the length of the entire system being 720¾ miles. The length found to be burst after the frost was 12¾ miles, or 1·75 per cent. of the whole. The freezing of the mains unquestionably commenced with the consumers' communication-pipes. The lessened draught of water diminished the flow, and eventually caused the water to stagnate and to freeze in the mains. The Directors understand that, on the occurrence of a continued frost, the temperature of the earth decreases rapidly to a depth of 5 or 6 inches; then less rapidly until below the depth of 1 ft. 6 in. The daily decrease is so gradual as to be almost imperceptible. If the frost is prolonged, it continues to penetrate into the ground after the surface is thawed. The depth at which a pipe is laid below 1 ft. 6 in. therefore appears to be immaterial even in a phenomenal frost, provided a flow of water is maintained.

"The late frost was not only severe, but prolonged; and it reduced almost to freezing-point the temperature of the water as it was sent into the mains, as the following figures from the report of Dr. E. Frankland to the Registrar-General for the month of February will show: Temperature of raw river water at Hampton, Feb. 4, 0·8°C.; after storage for 14·7 days, Feb. 4, 0·5°C.; Lambeth general filter well, Feb. 4, 1°C. The frost continued for some weeks after the 4th of February; consequently the temperature would diminish rather than increase. Water at such a temperature would chill the mains to a temperature below that of the surrounding soil, and rapidly reduce the heat of the latter. The effect of the frost on the ground was intensified by the absence of snow. In every week except one up to the week ending the 9th of March, the average mean weekly temperature was considerably below the average of 20 years; and for three weeks in succession, the average whole day temperature did not rise to 28° Fahr. The actual figures for this period were as follows: Week ended Feb. 2, 27·9° Fahr.; do. Feb. 9, 23·5° Fahr.; do. Feb. 16, 25·2° Fahr. The effects of so unusual a frost were not confined to the Lambeth Company's area, or even to London. Reports from the provinces show that in Birmingham, Sheffield, Liverpool, and other large towns, the inhabitants have suffered enormous inconvenience, and that the frost will entail so large a cost upon the ratepayers as will materially increase the rates in at least some of these towns.

"The Lambeth Company's mains were laid at a depth generally adopted throughout England; and that this depth is sufficient, under ordinary circumstances, is conclusively proved by the fact that mains which have been laid for 50 years have frozen for the first time this year—in fact, the general freedom from freezing, not only in ordinary winter weather, but during the recent most exceptional frost, tends to show that so far as the Lambeth Company's system is concerned, the mains generally are at a proper depth. There are manifest and numerous objections to water-mains being laid at an excessive depth. Upon this point, the Company's Engineer reports as follows:—

In the first place, it has yet to be determined how far a severe frost will penetrate into the ground. During the late frost, pipes of 5 and 7 inches diameter have frozen at depths of 3 feet and 3 ft. 4 in. respectively. The deeper a main is laid, the greater the difficulty in drawing the plugs attached to it; and, in case of fire, considerable delay might be caused before a supply of water could be obtained. This objection has already been pointed out by the officials of at least one local brigade. Again, in case of any repairs being required to be executed on a deep main, caused either by frost or other circumstances, the supply must necessarily be withdrawn while the repairs are being carried out; and the deeper the main, the longer the repairs will take, and the longer consumers would be deprived of their water supply. The fire hydrants fixed at the request of the London County Council have in numerous instances become frozen, and not available for attaching stand-pipes to them. These hydrants are fixed by the Company according to a specification and drawing issued by the London County Council. The depth of the hydrant-valve is specified, and no downward deviation is allowed. This leaves the top of the delivery-pipe 1 ft. 6 in. or less below the surface of the pavement, irrespective of the depths of the Company's mains to which the hydrants may be attached. As these hydrants are fixed in brick pits, and are quite unprotected from frost, they become in severe weather a fruitful source of trouble by freezing, and thereby increase the risk of the Company's mains becoming frozen.

"Mains have to be laid according to existing physical conditions. Sewers, drains, gas-pipes, &c., render any uniform depth impossible in old streets. It is also by no means uncommon for levels of new streets to be altered when they are made up and taken over by the parish, or when local improvements are carried out. It is further manifest that, as the mischief in all cases begins in the householders' communication-pipes, and in most cases is confined to such pipes, the lowering of the Company's mains, as suggested in some of the memorials, would not necessarily afford a complete remedy.

"Reverting to the memorials, complaint is made that, subsequent to the frost, the pressure in the mains was insufficient to carry the water to cisterns in the upper part of the houses. Such is, in fact, the whole of Major Waller's complaint. The deficient pressure was not due to any failure on the part of the Company to supply water. This is shown by the following figures: In February, 1895, the average daily supply was 22,655,578 gallons; whereas in February, 1894, it was 19,223,664 gallons. In March, 1895, it was 23,799,071 gallons; whereas in March, 1894, it was 18,704,631 gallons. The slackness of pressure was undoubtedly due to the enormous number of leakages from consumers' burst communication-pipes. During the month of March alone, the Company's men knocked up no fewer than 1000 broken communication-pipes from which water was pouring in such quantities that the severing and closing of the pipe was followed by an immediate and perceptible increase of pressure in the neighbouring houses. The districts which suffered most from this cause were those at the end of the Company's system.

"Some delay occurred in repairing burst mains belonging to the Company, owing to the impossibility of obtaining sufficient skilled labour. The Company's contractors used every endeavour to obtain a supply from the provinces, without result; jointers being in unusual request at Birmingham, Sheffield, and other provincial towns. An advertisement was inserted by the Company three times in nine London papers circulating among the working classes; and the Editors were good enough to permit the Company to call attention to it in the editorial columns. Notwithstanding all these efforts, only two additional water-pipe joint-makers could be obtained. The Company have throughout had an ample stock of pipes and materials, in spite of the unusual quantity required and used.

"As some of the memorialists allege that the Company did nothing to alleviate the discomforts of the householders, it may be remarked that, though the want of water was not due to any fault of the Company, 2206 stand-pipes were erected. One was fixed within 100 yards of Major Waller's premises. Where, owing to local circumstances, stand-pipes could not be used, water-carts (to the number of 93) were engaged in delivering water. Upwards of 400 additional men were employed; and the officers and servants of the Company were at work for very long hours. The cost to the Company of work incidental to the frost, already exceeds £12,000."

Major Waller's memorial, adjourned from the first sitting, was then taken.

Major WALLER stated that he had several letters from memorialists, stating their cases against the Company, and those he wished the Commissioner to accept.

Mr. BODKIN objected; pointing out the inconvenience of not having the memorialists there to cross-examine.

A discussion then took place between the parties, which brought out the principles on which the whole of these inquiries are to be conducted.

The COMMISSIONER: I think, as regards the question of evidence that is put before me, I must follow the lines that I inquire into this as an expert; and I make my own inquiries of the Company to any extent which seems to me desirable to arrive at the facts. I do not propose to limit my sources of information merely to those obtainable from persons who come here and give evidence; but, of course, I shall call for documents and statements and statistics from the Company of any kind which will assist me in arriving, as an expert, at the facts as to the condition of the water supply, so far as, in my opinion, it would affect the supply to the houses of any of the memorialists who have sent in memorials to the Local Government Board. I cannot accept such a limitation as you have advanced as to the documentary evidence put into my hands. I am quite willing that you should have a copy of anything; but, as an expert, I propose to draw my own conclusions from any document, and to make a report to the Board based upon those conclusions.

Mr. BODKIN: Without giving the Company, whom you yourself said were in the position of defendants, an opportunity of contesting any facts?

The COMMISSIONER: Yes; contest it in any way.

Mr. BODKIN: Or put any questions to the gentlemen who write these letters? I venture to say that it would not be a very satisfactory way of determining any facts contained in those letters, because they may not be facts. There may be matters mentioned with which the Company entirely disagree, and which they would be able to disprove; and therefore the attendance before you, sooner or later, of the gentlemen who wrote these letters would be necessary, I venture to submit, in order to see whether or not the complaints are well founded.

The COMMISSIONER: I think very probably it would be necessary to give further evidence if they are memorialists; and I think it would only be right that you should have an opportunity of asking them questions, if I consider it desirable to draw conclusions from their statements.

Mr. BODKIN: Then would it not be more convenient to let the witnesses Major Waller has mentioned give their statements orally, and be examined there and then before you? I venture to submit that this would be a better way than putting in written statements which you would have to consider; and then we must have copies of them to consider and ask for an adjournment to cross-examine on them.

The COMMISSIONER: I do not propose to go into any complaints whatever, except those made in the memorials which are addressed to the Local Government Board. I have no commission to inquire into any complaints except those of the gentlemen who sign the memorials.

Major WALLER: I thoroughly appreciate that. I will hand in copies of the letters from the memorialists to the Water Company's representatives.

Mr. BODKIN: I suggest that we should be allowed to see those letters; and, between now and the next meeting, we might communicate with you as to the course we thought right to pursue.

The COMMISSIONER: I agree to that.

After some evidence had been tendered of the usual character,

Mr. YOUNG suggested that Mr. Southam, the District Board's Surveyor, should agree with the Company's Engineer on a statement with reference to the burst mains.

Mr. BODKIN: There will be a statement from the Company, as to the depth of the mains, and the fact as to whether or not they were frozen, and where they were frozen; and that is contained to a great extent in the print I have just handed in.

The COMMISSIONER: I have asked for the statement of every fractured main, every fractured pipe, and various details as to the depths, and so on. Is that the whole of the information for the Company's entire system?

Mr. BODKIN: No. What is contained in the statement is the reference to various roads mentioned in the course of the memorials to the Local Government Board.

The COMMISSIONER: But I cannot, I think, reasonably confine the inquiry into the condition of the water supply merely to those sections of the pipe system which are particularly mentioned in the memorials. I look upon the whole supply in the Company's district as a unit; and I propose to treat it as a unit, and to ask for information with regard to the whole district.

Mr. BODKIN: I know you sent some requisitions to the Company on that point; and an answer to those requisitions is either in course of being forwarded or has actually been forwarded to you.

Mr. *Southam*, in cross-examination by Mr. BODKIN, was asked whether he still adhered to his previous statement that all mains less than 2 feet down had been frozen; and he replied that he did not think he said "all" mains less than 2 feet. Being pressed with the shorthand notes of his evidence on this point, witness said he had no recollection of his answer being made precisely in the form reported.

The COMMISSIONER: Do you withdraw the statement?

Witness: I could not say that "all the mains at a less depth than 2 feet have been frozen." I should have said very generally that the mains at a less depth than 2 feet were frozen, and that the mains laid at a greater depth were not frozen.

Mr. BODKIN: Did you go on to say that, if the mains were put down 3 feet deep, with even such a frost as we had last winter, and there was a constant supply, there would be no difficulty?

Witness: That was my opinion.

Did you know that there were mains more than 3 feet deep, and larger than 4 inches diameter (I think 5 and 7 inches respectively) were, in fact, frozen in this frost?—I am quite aware of that. In some instances, there were exceptional cases where the frost went down for a very considerable depth. We found frost 3 ft. 6 in. in depth.

Would putting the mains down to 3 feet, as you suggest, be a convenient course to adopt?—In many cases it would. It could be done with all new mains.

But would it not render the difficulty of drawing plugs much greater?—I do not see that it would. It might cause more delay in getting water in case of a fire. I do not know why the County Council insist that their hydrants shall be put at a less depth.

Do you know that some local brigades have pointed out that, in case of fire, the deepening of the mains causes a difficulty in getting the water as rapidly as possible?—I should have thought it was a difficulty that could be overcome.

Could you suggest how?—No; I should say that is a special thing.

The memorial of the District Board having been read by the Commissioner,

Mr. BODKIN raised the question whether Mr. Young, as Solicitor to the Board, could be heard to conduct the memorial. He said it was all very well for Mr. Young to say that his Board had sealed the memorial, and was a party who was complaining to the Local Government Board; but it was not only a person who had signed the memorial who came there and complained, but a person who was "an inhabitant householder paying rent for, and supplied with, water by the Company." He did not know where the Wandsworth District Board were supplied with water by the Company, nor did he know that the Board had a corporate being to be supplied with water; and therefore they did not come at all within the 9th section as "an inhabitant householder paying rent for, and supplied with, water by the Company."

The COMMISSIONER: I will take a note of your objection.

Mr. MARTEN, the Surveyor of the Streatham and Tooting district, proposed to give the results of inquiries from people as to their being without water.

Mr. BODKIN objected to that; the information obtained from a servant maid by one of Mr. Marten's foremen could not be tendered.

Mr. YOUNG said that the persons from whom Mr. Marten procured his information were present, and could corroborate what was contained in the document of the 3rd of April.

Mr. WILKINS: They could not be all taken on any one day.

The COMMISSIONER: I think it would be better to meet the difficulty, if it could be done, by having an evening sitting.

Mr. BODKIN: I asked for that.

The COMMISSIONER: If you fail to get your memorialists to come (and business people and working people we know cannot always come), I am perfectly ready to give them every opportunity of stating their case.

Mr. YOUNG: That would be the better course, and then call the witnesses.

Mr. BODKIN: But those are not memorialists whose addresses appear on this return whom Mr. Young so much wants to get before you. They are not persons who are unable to attend, and who have complained to the Local Government Board. They are persons who have not signed any memorial at all. It is a kind of general return about the houses of other persons who have had no cause to complain of the Company's behaviour, for they have not done so.

The COMMISSIONER: But you see there is a distinct way of treating that as evidence, on the ground that they give an answer as to the general condition of the water supply of the Company which affects other localities. I am perfectly aware myself, as an engineer, that, if there is a long main, and a failure occurs at the commencement of the main in the matter of water supply, then obviously the failure would become greater as the main extends; and therefore people might come forward and tell me that they had failed to get water in their houses at a particular part of the main, and I should not treat that as a complaint, but as information as to the condition of the water supply in that particular main at that point. It is perfectly open for me to do that.

Mr. BODKIN: You have a complaint before you of certain specific persons, who say they have been without water for a definite length of time. How, then, can it be of importance to inquire what other persons were not doing, or how they were treated, at other points of the Company's system?

The COMMISSIONER: If people came forward and stated that they had not received water in their houses opposite a particular portion of the main, the inference would be that the supply in that main failed in point of pressure. That would be, or might be, an inference.

Mr. BODKIN: That might be. But see the intricacy of the inquiry that one would have to embark upon. The fact that A, B, and C, in a particular road, did not get water, might lead one to draw an inference that D, E, and F, at another point in the same road, also did not get water. But it may be that the Company would be able to show that D, E, and F were not supplied by the same system of mains as A, B, and C; and therefore they would have to go into a general inquiry over the whole of the Company's system, to see whether you would be drawing a proper inference from the fact that A, B, and C did not get water, and D, E, and F also did not get their water, or *vice versâ*.

The COMMISSIONER: That is a perfectly legitimate engineering inquiry.

Mr. BODKIN: I agree that it is so. But is that the inquiry under section 9, which is into the specific complaint of not less than 20 householders that they did not get their water, or that the water was of bad quality? Upon that complaint you hold your inquiry under the directions of the Local Government Board, and you report to the Board, and the Board then have to do what? Simply to order—to serve the notice—that the complaint is well founded; and then it becomes the duty of the Company to remedy the complaint, and do away with the cause of mischief. Then that merely means that the complaint that the 20 people have lodged at the Local Government Board is to be remedied within a particular time under a penalty. How can it, therefore, if the complaint is from specific persons of a specific grievance, be necessary to go into a general inquiry into a company's system in regard to a number of other persons whom the Local Government Board, on your report, would have no power to benefit by reason of any notice they might serve under the Metropolis Water Act, because the parties were not persons who had given them jurisdiction to call upon the Company to remedy the complaint that was made. I say who had given them no jurisdiction, because they were not persons who had originally complained to the Local Government Board itself. It seems to me to enlarge this inquiry in the most unreasonable proportions to go into a general engineering inquiry as to the way in which the mains of this Company are laid, and their particular system of supplying water outside the specific part of the system which supplies the complaining memorialists. That is my point.

The COMMISSIONER: Well, I must say I cannot follow your argument. I consider that the whole supply must be treated as a unit, and that I am competent to require the Company to lay bare their arrangements and their system of supply, and to get all the information which will enable me to arrive at the conclusion as to whether the failures in one part of the system affect distant localities in another part in which the memorialists live; and if I took evidence with regard to failure of the supply to which you referred in a particular part of the system in which the persons who gave evidence were not complainants, and if the evidence they gave was simply that they had not received water, I am competent, I think, to read that, not as a complaint on their part, but as evidence that, in one particular section of the Company's supply, the pressure had failed, and the mains did not contain sufficient water. If I thought fit, I might piece that together with other evidence derived from the Company, and draw a conclusion one way or another. From an engineering point of view, the failure to supply the memorialists would be accounted for more or less. I might take that as part of the evidence, and treat it as throwing light upon the conditions of, and pressure in the mains, and their capacity for taking water to the particular locality in which the memorialists resided.

Mr. BODKIN: Then it would come to this: Supposing the Company's mains are between 700 or 800 miles in length. If 20 persons who were situated on the extremity—the western extremity—of the Company's system, or supplied by one 3-inch main, and all living within 100 yards of each other, complained, you would think the complaints of those 20 persons would entitle you to go into the condition of the whole of the mains over 750 miles of the Company's system, and inquire into the supply of all the other houses that are served by the Company? I venture to say that that would not be called a reasonable inquiry into a specific complaint.

The COMMISSIONER: Well, that is not the fact. As you are aware, there is not one complaint—I think there are something like eleven complaints.

Mr. BODKIN: Yes; but according to your observation just now, it would be only necessary to have one.

The COMMISSIONER: I do not see that. In that case, I do not pronounce an opinion. Looking at the particular subject before me, I see complaints scattered over a very considerable part of the district; and I say that this affects the question of the whole of the Company's system. I am not prepared to say that a failure, if there was one, in the main at the pumping-station at Surbiton would not affect any one of the localities in this district. Until I have examined the question, I am not prepared to say whether it would or would not; but it is part of my inquiry to ascertain what is the condition generally of the pressures, and of the mains as regards leakage, because I think it would very probably affect the localities in which there are complaints.

Mr. BODKIN: The suggested ground of complaint we cannot lose sight of. It is, of course, the frost, and the freezing of the water in the mains, and in the specific mains which, by the communication-pipes, supply the complaining householders. It is not through some general failure to supply water from the Company's system, but through natural causes—the effect of frost upon the mains, and, by reason of the freezing, the failure to give the particular householders their water—that the Local Government Board have caused this inquiry to be held.

The COMMISSIONER: You are now speaking of one phase of the frost—the freezing of the mains. The second is the leakage and repair of the mains; and this implies a large reduction of pressure, which may be evidence that part of the pipe will gradually fail as the distance increases, and fail because of leaks in the course of the main. Therefore, you see, it is a question of failure to supply water, it may be, over an extensive range. The cause of it may originate in a mill, or in the locality in which the failure exists.

Mr. BODKIN: That might be.

The COMMISSIONER: You may take it from me that it does.

Mr. BODKIN: Then I have no doubt it does. One's common sense would tell one that it does affect the general supply of water if there is leakage of a serious character perhaps at some distance on a particular main. But there is no evidence before you at this time that those other persons whose names are upon the return are supplied by

the same system of pipes at all as the system which supplies the 20 complaining householders.

The COMMISSIONER: That is precisely the character of the inquiry; and it is a matter of evidence I have to investigate.

Mr. BODKIN: There is no evidence at present.

The COMMISSIONER: We have not concluded the inquiry by any means.

Mr. BODKIN: No; I have to take the objection when I get the opportunity; and it will have to be discussed then. You are in possession of the view the Company take in this matter; I cannot put it before you more clearly than I have done. In order to give jurisdiction to the Local Government Board upon the specific complaint of specific people, you cannot throw upon the gentlemen who have the duty of conducting the inquiry the onus of going into a kind of roving Commission, and into the general question of the supply by the Company to any part of their district; and, so far as the evidence before you at present goes, there is no proof that those people, if they are people (because they do not give any names, addresses, or particulars of any kind on which we can identify who they are), are in any way supplied by the same system as the 20 complaining householders. I therefore contend that this evidence should not be received by you.

Mr. YOUNG: I do not wish to take up much of your time, Sir, but you are here to consider and inquire into the grounds of these complaints; and, as you put it, it is our duty to lay before you the complaints that we have ascertained from persons living in the immediate neighbourhood, as covered by this memorial, that they have been without water for a certain period. I have handed a copy of the complaint to my friend, and he can check it; and no doubt we can agree. If we have evening sittings, we can do our best to get the persons to appear.

The COMMISSIONER: I do not think these are complaints at all. I have ruled that I have no commission to enter into the complaints of other persons than those in the memorial. But whether or not it would be desirable to get independent evidence as to the failure of the water supply in other parts of the district, is a matter which I certainly would consider from time to time in the course of the inquiry. I think I may say that the Company themselves are, or probably would be, my principal informants on all those points, because they know better than anyone else what the condition of the water supply is; and I would rely on their giving me what information they can reasonably afford. I therefore may not consider that that evidence is necessary. But I certainly contend that, if I take evidence of that sort, not as a complaint against the Company, but simply as evidence regarding the condition of the supply, it is quite within my competency to do so.

Mr. YOUNG: I am quite content to leave it in that way.

This concluded the evidence on the Wandsworth District memorial.

The COMMISSIONER said he proposed to take the evidence of all the other memorialists as soon as possible; and, during the adjournment, to make a personal inspection. Then he would, on some future day, hear a statement from the Company.

Those memorials were accordingly adjourned *sine die;* and the proceedings closed for the day.

On Friday, the 26th ult., the Southwark and Vauxhall Water Company's case was resumed. This was the fourth day for hearing memorials; and it was understood that the complaint of the Wandsworth District Board of Works would be taken.

Mr. W. B. THORPE was allowed to call a Mr. *Carey*, a civil engineer, to speak with reference to the deficient supply of water in the case of a fire, attended with fatal results, inquired into by the Coroner.

Mr. W. B. TANNER contended that, as it had been judicially determined by the Coroner that it was owing to no fault of the Company, the matter could not be gone into again.

The COMMISSIONER, however, ruled that Mr. Carey could state facts as to the pressure from the mains.

Evidence on this point was accordingly given.

Mr. YOUNG then addressed the Inspector on behalf of the Wandsworth District Board. He advocated the laying of the mains deeper than at present. Then he contended that, under the present system, there was this anomaly, that whereas the Gas Companies were responsible for connection-pipes, the Water Companies were not; and the memorialists considered that the latter Companies should be placed on the same footing as the former. The service-pipes should, he argued, be under the Company's control; and they should be liable for the proper supply of water, and no excuse be left to them for throwing the responsibility on the consumer.

Witnesses were called who gave evidence of the usual character; and it was arranged that the Company's case should be further gone into on a subsequent day.

A sitting was held last Wednesday, at the Lambeth Vestry Hall, in order to continue the inquiry into the complaints against the Lambeth Company.

Mr. H. J. SMITH appeared for the Lambeth Vestry; but, at the outset of the proceedings, Mr. MAY, on behalf of the Company, objected to his *locus standi*.

The COMMISSIONER said the Local Authority, in his opinion, had no right to cross-examine witnesses, to give evidence, or to intervene in the inquiry; but, on the other hand, he did not think the Company were entitled to object, for the reason that the scope and conduct of the inquiry were left entirely in his hands. He considered, therefore, that he was entitled to avail himself of the assistance of the Local Authority of Lambeth, as he had done in the case of the Wandsworth District Board of Works. The area involved in the inquiry was so extensive, that there must be a delegation of work in connection with it; and it was a very proper, reasonable, and useful proceeding that the staffs of the Local Authorities should be employed, under his sanction and by his delegation, to collect information on these matters.

Mr. MAY: I hope, Sir, you will take a note of my objection. If I may say so, I particularly object to the inquiry being delegated to other persons.

The COMMISSIONER: What I say is that I employ—it must be taken in that way—the officials of the Local Authority to collect information for me on the subject.

Evidence was then given in support of the memorials from the districts of Herne Hill, Cold Harbour Lane, and Vaughan Road, Loughborough.

Mr. R. D. MUIR, Barrister, in support of one of the memorials, referring to the argument that the Company were not responsible for any cessation of the supply if the householder's communication-pipe froze, said that, if this were so, the Company never could be made liable for the result of a frost, because, having laid their main at a shallow depth and the communication-pipe being necessarily fixed on the top of the main, and carrying a small body of water as compared with that in the main, the pipe must inevitably freeze before the main did. The regulations which were adopted by all the Metropolitan Water Companies in 1871 prescribed that the communication-pipe should be placed at a depth of 2 ft. 6 in. below the surface of the ground; but the Company, by laying their main in his road at the depth of 1 ft. 9 in., had made it absolutely impossible for him to comply with their regulations. He submitted that, in a newly-made road such as his, the Company ought to have laid their pipes at a proper depth.

At the close of the day's proceedings,

The COMMISSIONER referred to a letter sent by the Lambeth Company to the Local Government Board, a copy of which had been formally handed to him. In this letter the Company stated that they supplied 100,600 houses and buildings, of which about 70,000 were situated within the Administrative County of London. The Board had forwarded to them altogether 18 communications, with 369 signatures appended, complaining of a short supply of water during and following the frost. Of these communications, three were signed by one person only; five others were signed by less than 20 inhabitant-householders supplied by the Company. Only 15 signatories had paid their water-rate for the quarter from Christmas Day to Lady Day; and the others were consequently not entitled to water at any time during that quarter, and therefore were not legally in a position to complain of a failure to supply. The alleged failure appeared to be admittedly due to the frost and its effects, which the Company urged did not come within the 9th Section of the Act, but was covered by other statutory provisions. They further submitted that, the frost having disappeared, the proceedings now pending were rendered nugatory. He said he did not see anything in the letter which would stand in the way of his taking evidence. If there was anything in it, it would have to be decided at a later period. As regarded the non-payment of the quarter's water-rate, he presumed it was really a matter of convenience for the Company that there should be only two collections in the year, and that one quarter should be paid in arrear and another in advance. So that, without entering into the legal aspect of the question, this seemed to him to be hardly an objection which need have been raised. As regarded the cessation of the frost, the opinion of the Law Officers of the Crown was that the question went beyond that, and that the grounds of complaint might be held to be defects in laying the mains, or anything of that nature; and therefore he should hold that the inquiry should go on, irrespective of this statement of the Company. Of course, if the Company liked to urge the question any further, they could do so at a later period. On the 19th of April, he had written to them, and requested that information might be furnished respecting the pressures maintained in the mains at various points; and, for the purpose of collecting such information, he had asked that two persons should be appointed to gauge and record such pressures daily—suggesting that the Surveyors to the Local Authority should assist in taking the records, in order that there might be agreement as to facts, and that, as far as possible, a conflict of evidence might be avoided. To this letter the Company's Secretary replied as follows:—

"The Directors desire me to say that, as you are aware, they are at all times willing to afford you every information in their power; but your letter foreshadows a heavy expense, apparently without any corresponding advantage. The pressure at any specific point on the mains may be so affected by varying local conditions as to render any observations at such point valueless, if not misleading, for the purpose of a general deduction, even within a limited area. Your suggestion that the observation should be carried out in conjunction with the Surveyor of the Local Authority appears to convey the impression that the Company are not to be relied upon for submitting accurate information, although the Directors cannot believe that any ground exists therefor. The Directors are unable to gather from your letter whether you desire the information in your capacity as Water Examiner, or for the purposes of the inquiry you are holding into certain complaints purporting to have been made under the 9th section of the Metropolis Water Act, 1852; but, in the latter case, the Directors desire me to point out that observations carried on into the summer months can have but little bearing upon complaints of an insufficient pressure under totally different conditions."

In reply to that letter, he had repeated his request, and pointed out that it was made for the purpose of the inquiry he was holding, under the authority of the Local Government Board, into complaints made under the 9th section of the Metropolis Water Act, 1852. With regard to the question of the utility of taking these pressures, he must decline to enter into any discussion whatever with the Company, because it was sufficient if he said it was necessary for his purposes. With regard to the observation that the request appeared to convey the impression that the Company were not to be relied upon for submitting accurate information, it was totally uncalled for; as it was perfectly obvious that a certain number of these measurements must be taken by persons other than himself. He would like to know what the Company proposed to do in the matter of his requisition.

Mr. MAY, dealing with the first letter, said there had never been the slightest intention on the part of the Company of inducing the Commissioner to cease holding these inquiries. The letter was a general reply by the Company, wherein they had thought fit to raise certain points which they had been advised it might be necessary to bring forward. If the Company had thought fit to stand upon what they might call strict legal ground, they might have held aloof altogether from these inquiries; but this had not been their policy. Their policy had been to give full and frank information on the whole subject. At the same time, they were bound to safeguard themselves

with respect to these requisitions; and a copy of the letter had only been sent to the Commissioner, because it might be said hereafter that he was sitting in a more or less judicial position, and that in this capacity observations addressed to the Local Government Board ought to have been brought personally to his knowledge. With regard to the second letter, dealing with the taking of the pressures, there was a meeting of the Directors of the Company on the previous day, at which the Secretary was instructed to reply; and, with the greatest respect, he ventured to refer the Commissioner to that letter, in order that he might ascertain what was the policy.

The COMMISSIONER: Then I must ask Mr. Wilkins.

Mr. MAY: I think, Sir, Mr. Wilkins will say that the letter will state clearly the course the Directors propose to take.

Mr. WILKINS: I think that is all the information I can give, Sir; and I would very much rather refer you to the words of the Directors than any gloss which I might put upon them.

The COMMISSIONER: Very well. Then, of course, I shall deal with the letter when it comes to me.

The inquiry was again adjourned.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is to me somewhat amusing to see, at the North of England Gas Managers' Association and elsewhere, the belief expressed and reiterated that the rise in the price of oils will seriously affect the use of oil for gas making. Those who entertain this view, do not read carefully or intelligently. It does look at first sight as if the high price would have the effect stated; but let me point out that it is only burning oils which are advanced in price. No mention is made of lubricating or other oils, which form practically the residual products of oil-producing processes. I am dealing with oil derived from shale, which is the only oil that is refined in Scotland on a commercial scale. As a matter of fact, only from 30 to 40 per cent. of the oleaginous matter which is derived from shale can be converted into burning oil. The remainder is too heavy for use in lamps in which wicks are used: and it is consequently prepared in various ways for the market. It has never been regarded as a profitable product, and refiners have strained every effort to get as much of the burning oil out of their material as possible. The introduction of the Peebles oil-gas process made an outlet for the inferior oils—indeed, it will be remembered that it was to find a means of utilizing them that Mr. Young, by request of an oil company official, undertook the study of a reliable system of oil-gas making. He was successful; and by his process the thickest of oils—down even to tar—have been permanently gasified. The result has been, as was expected, a considerable rise in the price of the inferior oils. Now that burning oils have been advanced about 50 per cent. in price, the question is how the inferior oils will be affected. I suspected that a too hasty assumption was being made by those who anticipate that the price of oils will rise until gas making from them becomes unprofitable; and I put myself to some trouble to ascertain the real position of matters. As I have said, the prices have advanced upon what they were two or three years ago. Under the present spurt in burning oils, they are likely to be affected a little more; but then, as the result of my investigations, I am inclined to think that, instead of a further advance, there will soon be a decline in prices. The reason of this is that on account of the rise in the price of burning oils, there is certain to be a great effort on the part of oil companies to produce as much of them as possible, with the consequence that more of the inferior oils will be produced than the market will conveniently absorb. There will thus be a plethora of the inferior oils; and prices for them may be expected to fall. So far this is theory; but I am pleased to see that in the annual report by the Directors of the Linlithgow Oil Company, which is published to-day, my assumption is borne out. The report states that during the year "prices of burning oils, naphtha, lubricating oils, and wax were extremely low. Sulphate of ammonia and gas oils were in good demand, and realized more than during the preceding year." Then, after speaking of the rise in the price of burning oils by 3d. per gallon, it goes on to say "moderate advances have been made in naphtha and lubricating and gas oils." It has been pointed out to me that, in consequence of the reasons above given, the Peebles process will derive an advantage from the rise in the prices of burning oils, as it is the only process in which the thicker oils can be used profitably; and that all the other systems—the water-gas processes included—which require the finer oils to carburet with, will suffer.

Before leaving the subject of oil gas, I may say that I am able to give the opinions of a number of gas managers who are using the Peebles process, as to its behaviour during the recent great frost. Mr. Thomas Whimster, of Perth, writes that he did not experience any deficiency in the illuminating power of the gas supplied from his works during the extreme cold of the past winter. Although the temperature reached 38° of frost during the months of January and February, the proportion of oil to common coal was the same as in the preceding months; and the illuminating power of the gas was very regular—averaging 28·20 candles in January, and 28·48 candles in February. He found no trace of condensation beyond the oil-gas meter, but everything continued to be as usual in that respect. Mr. A. Scott, of Galashiels, writes that his illuminating power averaged from 30½ to 32 candles; and when the frost was at its keenest, they never required to increase the percentage of oil gas—the extremely low temperature appearing to exercise no injurious effect on the illuminating power. There was an almost entire absence of frozen lamp-pipes, and of deposits of naphthalene. Mr. W. Thomson, of Musselburgh, states that the oil gas had stood the test of the past severe winter. He had had no difficulty in maintaining the illuminating power at 28 candles; and there was less deposit in the street traps. Mr. G. Malam, of Dumfries, gives it as his opinion that low temperature does not in the least affect the permanency of oil gas.

The Hamilton Corporation Gas Department is splendidly managed, both as regards the technical side (which is in the hands of Mr. W. Ewing, the Manager) and in the matter of public policy, which is largely under the control of Mr. Brown, the Convener of the Gas Committee. The financial year of the department terminated on March 14; and it says a great deal for the business capacity of Mr. Brown that, while he last year estimated a surplus of £798, it has actually amounted to £790. Closer estimating need scarcely be looked for. The total profit for the year was £2408; and, after paying interest, there was left £1790. Out of this, £1000 has been set aside for depreciation, leaving £790 to be carried forward. Last year the Commissioners reduced the price of gas from 2s. 11d. to 2s. 1d. per 1000 cubic feet, and abolished meter-rents, from both of which causes the community have received benefit to the amount of £2725. On the technical side, it is impossible to recognize the great difficulties Mr. Ewing had to contend with—first in the strike of the coal miners last year, and then in the great frost. Yet Mr. Ewing comes triumphantly out of them. The quantity of coal carbonized rose, as compared with the previous year, from 7296 tons to 7772 tons; and the yield of gas increased from 71,876,000 cubic feet to 80,623,100 cubic feet. This represents a yield of 10,393 feet per ton, which, considering that only third-class cannels and shale are used, must be regarded as very good working. Besides the yield of gas, there was obtained 546,458 gallons of tar and ammoniacal liquor—an increase upon the return in the previous year of 113,230 gallons; and 3067 tons of coke—an increase of 1046 tons. The price realized for tar and liquor was £1644, as compared with £1007; and for coke, £883, as compared with £533. With £79 derived from spent lime, there was a total received for residuals of £2607, which works out at 6s. 8½d. per ton of coal carbonized. I wish I could state the price of coal per ton, as I am confident it did not greatly exceed the amount received for residuals. The burgh of Hamilton is greatly inconvenienced, in more ways than one, by the existence of underground coal workings. In connection with the gas undertaking, this leads to a very high rate of leakage. Last year the loss in unaccounted-for gas was 18 per cent.; but as in the previous year it was 19·7 per cent., an improvement has been effected in this direction too. Nothing but congratulation can be given for such excellent work.

The Corporation are brought face to face with another delay in the extension of the storage provision at their works. When the Commissioners recently resolved to cut down the size of a projected new holder from 130 to 102 feet diameter, it became apparent that the site they had selected would not be required, as they have land already beside their existing holders upon which one of the size contemplated may be erected. The Gas Committee accordingly recommended that the new holder should be placed in line with the others. At a meeting of the Commissioners this week, very strangely, the gentleman who was chiefly responsible for the smaller holder being proceeded with, objected to the site. His objection was the personal one that if placed where the Committee suggested, it would be close to property belonging to him, and would interfere with the light to his houses. The proposal is to construct both the tank and holder above ground; and he objected to a structure 75 feet high being placed near to his property. The Commissioners, I suppose sympathetically, sent the subject to a Committee to consider.

The output of gas in Perth in the financial year which closed on Tuesday, amounted to 105,385,200 cubic feet, which is over 9,000,000 cubic feet more than in the preceding year, and is a larger increase, by 108,000 cubic feet, than that in any previous year in the history of the Gas Commission. The full results are not yet to hand; but it has to be noted that this satisfactory increase has been attained with the price of gas sold within the city at the same figure—3s. 9d. per 1000 feet—as it was in the previous year. There was a reduction of 5d. per 1000 cubic feet in the charge for gas in the outlying districts, and one-third of the charge for meters was thrown off; but these were all the reductions given. The increased output is the more gratifying that there was a decrease a year ago of nearly a million cubic feet.

The financial year of the Dundee Corporation Gas Department terminated on Tuesday night. It is reported that there has been an increase of upwards of 20 million cubic feet of gas produced, as compared with the preceding year, in which, however, there was a decrease of over 27 million cubic feet on the output of the preceding year. The price of gas was retained at 3s. 4d. per 1000 cubic feet last year.

This week the Water Committee of the Glasgow Town Council visited Killearn, and turned the water on in the Blane Valley section of the new aqueduct. Of the total length of the aqueduct—23½ miles—there are 13¼ miles open; and other 3½ miles are expected to be in use before July. The Blane Valley section, which has been under construction since March, 1890, is about one-fourth of the whole length. There are five tunnels in it; the longest being 1¼ miles in length. The total cost of the section was £160,000, or £30,000 per mile.

Extension of Mains by the South Metropolitan Gas Company.—The South Metropolitan Gas Company have extended their mains to Abbey Wood, a residential district under the jurisdiction of the Erith Local Board.

The Assessment of the Oldham Gas-Works.—A re-assessment of the whole of the Oldham Union has increased the amount of the poor-rate upon the different properties belonging to the Corporation—the difference to the Gas Committee alone being more than £1000 a year.

West Bromwich Gas Supply.—The Gas Committee of the West Bromwich Corporation, in a report just issued, state that the sales of gas during the financial year ending March 31 last were 205,752,100 cubic feet, against 198,833,900 cubic feet in the previous year; the amount of the gas-rental being £26,147, as compared with £25,300. The production of coke for the ensuing six months has been sold, as well as the stock on hand.

Rochdale Corporation Gas Supply.—At the meeting of the Rochdale Town Council last Thursday, Alderman Petrie, the Chairman of the Gas Committee, stated that the Gas Committee intended to pay out of the gas profits £1500 to the reserve fund to meet depreciation; and as they had been able to purchase coal at a cheaper rate, they had decided to reduce the price of gas to what it was nine months ago. Alderman Baron pointed out that the rates would this year be increased by 4 per cent.; and he thought it questionable whether it was a wise course to reduce the charge. After discussion, the Council decided to reduce the price 3d. per 1000 cubic feet to ordinary consumers, and 6d. to those who used gas for heating purposes.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 4.

Sulphate of Ammonia.—The market during the week has been quiet; and the value is at about £9 7s. 6d. per ton f.o.b. at the ports, although at the close there is rather a better feeling. The demand for prompt stuff scarcely keeps pace with the decreasing production at this period of the year; and only the inquiry for forward delivery has had the effect of steadying spot prices. Orders are being booked for autumn shipment, for the most part by dealers, who seem to have less confidence in any important advance than have the makers; for, while meeting the market for prompt delivery, makers decline to commit themselves far ahead at anything like the prices obtainable. Nitrate is quiet in all positions—spot, at 8s. per cwt.

LONDON, *May* 4.

Tar Products.—Benzols are apparently still in over-production, notwithstanding the considerable quantities that are being used for enriching gas. It was hoped that the improved condition of the aniline trade would have reflected itself on the value of benzols before this. Pitch is firm; and the inquiry is good. Both carbolic acid and cresylic acid are also in request; the former having made a distinct advance during the week. The stocks of crystals that depressed the carbolic market have disappeared; and it is expected that carbolic acid will see better prices. Creosote and common oils, as well as solvent naphtha and anthracene, are flat. Business prices during the week are as follows: Tar, 18s. to 21s. Pitch, 34s. Benzols, 90's and 50's, 1s. Solvent naphtha, 1s. Toluol, 1s. 1d. Crude, 30 per cent., 4½d. Naphtha, 4½d. Creosote, liquid, 1½d.; ordinary, 1d.; salts, 20s. Cresylic acid, white, 1s. 1d.; brown, 10½d. Carbolic acid, 60's, 1s. 8d. Anthracene, "A," 1s. 1d.; "B," 10d.

Sulphate of Ammonia.—The depression in this market has been unparalleled in its history. Prices that have ruled during the past week are said to be the lowest on record. Not much business is being done; but sales have not averaged more than £9 7s. 6d., less 3½ per cent. in all positions. Gas liquor is quoted at 7s. to 8s.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Business continues to drag on very unsatisfactorily, as regards all descriptions of round coal; and although most of the colliery proprietors throughout Lancashire hold out against making any actually official reduction on their list rates, prices in the open market tend in a weakening direction. There is a good deal of irregularity where business of weight is concerned; concessions being readily obtainable by buyers who have orders of any moment to place. There is nothing further at present to note with regard to gas coals; but it may be added that attention is now being directed towards the locomotive fuel contracts which will shortly come forward. For these, it is expected there will also be some exceedingly keen competition, at prices much less than last year; the opinion being expressed in one well-informed quarter that railway companies will be able to buy at something like 5s. 9d. per ton at the pit mouth. In the general coal trade, the demand is steadily lessening; and even with pits not working more than four days per week, supplies are plentiful. The prices quoted remain at 10s. to 10s. 6d. per ton at the pit, for best Wigan Arley; 8s. to 9s., for seconds Arley and Pemberton four-feet; and 7s. to 7s. 6d., for common house coals. The lower qualities of round coal continue in only very slow request; 6s. 6d. to 7s. per ton at the pit mouth being the average figures. Supplies of engine fuel are being disposed of fairly well; and with the present small production of slack, owing to the depressed condition of the round coal trade, buyers are naturally rather anxious as to their requirements during the summer season, so that there is little difficulty in selling for forward delivery. This gives a firmness to prices for engine fuel. But as yet these show no actually quotable advance. Common slack averages 3s. 6d. and 4s. per ton at the pit; and better qualities, 4s. 6d. to 5s. Only a very slow business is reported for shipment; and where orders are booked, it is at extremely low prices. For delivery at the Garston Docks or the High Level, Liverpool, ordinary steam coal does not average more than 7s. 6d. to 8s. per ton.

Northern Coal Trade.—There has been a rather better demand for coal during the past few days; and as the ports in the Baltic are opening out, there is the probability of a further improvement in the seaborne part of the coal trade. Best Northumbrian steam coals are a little more in request, and are quoted at 8s. 9d. per ton f.o.b.; while second qualities are to be had at about 8s., and steam smalls at 3s. 9d. per ton. For household coal, the price is a little easier; but coal-owners make reductions slowly. In regard to gas coals, the demand is now small for local use; but for export it is fairly good, though the prices are lower than they were—from 6s. 4½d. up to about 6s. 10½d. per ton f.o.b. being the current quotations for large quantities. Some of the parts of the large London contracts are believed to be about 6s. 6d. per ton f.o.b. There is little or no alteration in the prices of manufacturing coals. The demand for smithy coal is stronger, as the exports are now becoming heavy. As to coke, the request is better, both for export and for home supply. The price is a little firmer, but not quotably altered from 12s. 6d. to 13s. 6d. per ton f.o.b. Gas coke is quiet at recent prices. The reduction of the wages of the miners of Durham, through the award of Lord Davey, the Umpire, will very possibly enable the coalowners here to secure one or two additional foreign ontracts.

Scotch Coal Trade.—Inactivity still characterizes the coal trade in Scotland. Even with a great deal of broken time in the pits, stocks are accumulating, which has a deadening effect upon prices. Ell continues to be the only variety for which there is any forward demand, which is accounted for by the opening of the Baltic ports. There is a good deal of inquiry for splint and other gas coals, the prices for which are ruling lower than last year, though not to such an extent as some expected. Splint may, in some instances, be had as low as 4s. 6d. per ton at the pits. The market quotations are: Main, 6s. per ton f.o.b. Glasgow; ell, 7s.; splint, 6s. 6d. to 6s. 9d.; and steam, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 151,487 tons—an increase upon the quantity in the previous week of 29,614 tons, but a decrease on the corresponding week of last year of 9791 tons. For the year to date, the total shipments have been 1,873,410 tons—a decrease upon the same period of last year of 322,778 tons.

Selby District Council Gas-Works.—The Manager of the Selby Gas-Works (Mr. M. Dunn) has presented to the District Council his annual report, which is of a very gratifying character. Notwithstanding the heavy expenses incurred during the year in refitting and reconstructing the works, there is a net profit of £1449, which is equal to £7 17s. 7½d. per cent. on the capital employed (£18,420). The increase in the number of consumers amounts to 10 per cent.

Tarapaca Water-Works Company.—The seventh annual general meeting of this Company was held on Monday last week, at Winchester House, E.C.—Mr. R. Harvey in the chair. In moving the adoption of the report, which has already been noticed in the JOURNAL (*ante* p. 913), the Chairman explained that the reduction in the dividend from 10 to 7½ per cent. was not due to adverse circumstances or to decreased business; for, as pointed out in the report, the receipts exceeded those of last year—one of the best on record—by £6000. The amount of the lawsuit in Chili, and the expenses in connection therewith (£16,685) had been written off; but, in addition, the Company might still be called upon to pay a further sum, as the plaintiffs now claimed the premiums on some shares which were held in abeyance, and also the dividends on those shares. The preliminary expenses were now entirely written off; and £15,000 was carried to reserve. Of this amount, £10,000 was for the payment of debentures, as the Directors did not think it right that they should be renewed. Mr. J. J. Smith seconded the motion, which, after some discussion, was carried.

Odessa Water-Works Company, Limited.—The ordinary general meeting of this Company was held on Monday last week, at the Cannon Street Hotel, E.C.—Sir Peter Spokes in the chair. In moving the adoption of the report, the principal portions of which were given in the JOURNAL for the 23rd ult. (p. 858), the Chairman congratulated the shareholders on the improved position of the Company. In addition to being able to pay a better dividend, the Board could report that more satisfactory relations now existed between the Municipality of Odessa and the Company. The most noticeable event that had happened since the previous meeting was the final decision—unfortunately against the Company—of the third lawsuit referred to in last year's report. It was gratifying to find that the revenue in 1894 exceeded by £7000 what it was in 1893. Of this amount a total of £4600 was obtained from water-rents, and £2274 from miscellaneous receipts. The item of temporary loans had disappeared from the balance-sheet; and the assets showed an increase in cash of £3000, which it was proposed to distribute by making the dividend 6s., instead of 4s. per share as in 1893. The motion was seconded by Sir A. T. F. Clay, and carried. On the motion of the Chairman, seconded by Mr. G. May, the dividend recommended was declared. The Chairman next proposed a resolution authorizing the Directors to agree with the Municipality as to the terms on which the redemption of the Company's property should take place, and to do all things necessary for giving effect to the terms which might be agreed upon. Mr. E. Allen seconded the motion, which, after a discussion, was carried with five dissentients.

The Newquay Gas Company, Limited.—The 25 years' existence of this Company has been a very disappointing one for the shareholders; and now the Directors are making a hard struggle to secure for the Company a more prosperous future. They have spent a considerable sum of money in improving the supply; and, the work having been completed, they have during the past few days been holding an exhibition, in order to show the consumers the latest improvements and novelties in gas lighting, cooking, and heating appliances. On the first day of the exhibition, Mr. Clarke, one of the Directors, delivered an interesting address, in the course of which he said that, although the Company had been in existence for a quarter of a century or more, it had been as unsatisfactory to the inhabitants as to the proprietors. When he first became interested in the Company, the Directors did their best with the works, but failed. They then called in the services of a gentleman as lessee, who carried on the works for two or three years; but, notwithstanding his knowledge of gas manufacture, he landed them in the Bankruptcy Court. This was not encouraging; but on resuming possession of the works, the Company made a further effort, the result of which might be described as "many grumbles and no dividend." The Company ultimately determined to make the works thoroughly efficient; and they had practically reconstructed and enlarged them in such a manner that pure gas could now be manufactured of practically unlimited quantity. It had been said again and again that the price of gas was too high. This, however, was not so much the fault of the Company as of the consumers. It was a statistical fact that neither at Newquay nor elsewhere could gas be supplied cheaply, unless there was a comparatively large consumption; and in all places where, like Newquay, the consumption was insignificant, the price was correspondingly high. The question was asked why the Directors did not lower the price? It was not very encouraging, after an experience of 25 years, during which no dividend had been received, to be obliged to spend an additional £3500, and then to be asked to lower the price, which, with the present consumption, was in truth asking the Company to spend 20s. in order to gain 15s. Still, if the public would encourage them, the Company would do their utmost to meet their wishes. They would try the experiment of reducing the price in June next to 5s. 9d. per 1000 cubic feet; and if they received any real encouragement, they would lower it to 5s. 6d. at Christmas. This might have the effect of realizing a further loss; and it would be understood that the Company could not go on continually losing money. They certainly hoped, however, there would be such an increase of consumption as would justify the reduction. It was also stated by another speaker that the Company were going to charge 4s. 6d. for gas used for cooking and heating, as against 5s. 9d. for lighting.

The York Town and Blackwater Gas Company, Limited, have decided to raise an additional £1000 of capital, required for the purpose of laying a 6-inch main to Camberley.

The Use of Gas for Other than Lighting Purposes at Halifax.—The number of gas cookers, fires, detached burners, engines, &c., in Halifax, has increased from 5276 in 1888 to 16,432 this year.

Increased Storage for the Ashford Water-Works.—The Ashford Water-Works Committee contemplate the construction of a new reservoir at Barrow Hill, of a capacity of 250,000 gallons, at an expenditure of about £1000.

The Port Louis Gas Company, Limited, has been registered with a capital of £35,000, in £1 shares, to acquire certain gas-works at Port Louis, in the Mauritius, and to carry on the business of a gas and electric light company.

Reconstruction of the New Tredegar Gas-Works.—The New Tredegar (South Wales) Gas-Works are to be entirely reconstructed to the designs of the Company's Consulting Engineer, Mr. C. White, of Blaenavon; and the order for the whole of the work has been placed with Messrs. Willey and Co., of Exeter.

The Airdrie Iron Company have secured the contract for the iron-work in connection with the erection of a new retort-bench of five ovens for the Airdrie Gas Company. They are also supplying the cast-iron retorts and mountings in connection with the introduction of the oil-gas system into the Falkirk Gas Commissioners' works.

The Water Supply of Gomersal.—At a meeting of the Gomersal District Council last Wednesday, it was reported that the Water Company had declined a request made by the Council to reduce the price of water; and a deputation was appointed to wait upon the Directors and ask on what terms and conditions they would sell the undertaking. The Chairman (Mr. Jackson) said the Company had been approached upon the subject before, and had then asked £10,000.

The Gateshead Town Council and the Water Supply.—The Gateshead Town Council recently instructed one of their Committees to consider the question of the water supply of the borough, with the view of taking steps to have an official inquiry as to its failure during the winter, in order that a recurrence might be obviated. The Town Clerk communicated with the Local Government Board on the subject; and he has received a reply to the effect that it does not appear that the Board has power to order an inquiry such as that suggested.

The Water Supply of Newport (I.W.).—The Corporation of Newport (I.W.) have had under consideration in committee a report on the question of new water-works for the town. This states that an abundant supply for the town could be procured at Idlecombe, where buildings and machinery could be erected, and the water conveyed to the existing reservoir. The estimated cost of the works would be £12,000. An alternative scheme, calculated to cost some £8000, has also been submitted; the proposal being, instead of moving the present water-works, to secure a supply from the higher strata above the range of pollution, and to run it down to the present works.

Extended Use of West's Retort-House Machinery.—The Sheffield Gas Company have decided to extend the use of stoking machinery, and have instructed West's Gas Improvement Company, Limited, to put in hand another complete installation for their Neepsend works, comprising coal and cannel breakers, elevators, conveyors, storage hoppers, drawing and charging machines of the compressed air type, and the necessary air-compressing plant. The Directors of the Torquay Gas Company, after visiting the Plymouth and Cheltenham Gas-Works to inspect the stoking machinery in operation at these places, have decided to adopt West's machines, and have put in hand the necessary work for a complete installation on their manual system.

The Whessoe Foundry Company, Limited.—We learn from the Whessoe Foundry Company, Limited, that they have received the order for a large oil-storage tank, to hold 450,000 gallons, for the Belfast Corporation Gas Works, to the design of Mr. J. Stelfox, the Corporation Gas Engineer; also that the same Company have on hand several oil-storage tanks, to contain a million gallons each, for the Russian trade. Several large gasholders and steel tanks have recently been placed with the Company; making, we understand, the total cubical capacity of holders in hand with them about two million feet. We further learn that the Cape Town Gas Company have placed with the Company an order for two of Kelman's patent scrubber-washers.

Singapore Gas Company, Limited.—The accounts of this Company for the half year ending December last indicate a decided improvement on those of the previous six months. The advance in the price of gas supplied to private consumers has resulted in a satisfactory increase; and the revenue from the public lighting has also improved. The receipts from products, fittings, &c., without exception, show better results; and, though the loss on exchange has advanced considerably, on account of the lower average rate of the dollar, the effect of this increase is reduced to a certain extent by the less cost of the coal carbonized. After several writings off (one of which was £708 for depreciation of works and plant), the available balance left is £1069, which the Directors recommend should be carried forward to the profit and loss account of the succeeding half year.

Webster (Mass.) Water-Works.—At a recent meeting of the New England Water-Works Association, a paper was presented by Mr. F. L. Fuller, of Boston, on the Webster (Mass.) Water-Works system. This town, of about 7000 inhabitants, is situated about 16 miles from Worcester, and the works were built two years ago. The source of supply is a lake in the locality; but the water is pumped from a well 30 feet deep, and 25 feet in diameter, and situated about 300 feet from the shore of the lake. The pumping-station is from 30 to 40 feet from the well; and the water-pipe varies from 6 to 16 inches in diameter. The stand-pipe, 100 feet high and 30 feet in diameter, is covered by a wooden roof. Between the water-main and the stand-pipe is a gate, a bye-pass, and a check-valve; so that, if the pumping should be stopped, there may be direct pressure from the stand-pipe to the pipe system. In various parts of the town, the water pressure ranges from 115 lbs. down to 40 or 50 lbs. The consumption is about 200,000 gallons a day; but it will probably increase. The water is of excellent quality.

The Water Supply Company, Limited, has been registered with a capital of £50,000, in £10 shares, to acquire on lease and carry on the water-works in Vienna, secured by an Imperial concession of the Austrian Government, under an agreement made between La Société-Compagnie des Eaux de Vienne (a Company registered in Brussels), and Messrs. Meyer and Co., of Liverpool, and to adopt and carry into effect an agreement expressed to be made between Messrs. Meyer and Co., of the one part, and the Company of the other part, for the acquisition of the lease by purchase.

The Mexbro' District Council and the Water Undertaking.—The Mexbro' District Council have received a letter from the Local Government Board, in reference to their intention to purchase the water-works. As to the proposal to borrow £3400 for the purpose of making extensions and improvements to the works, the Local Government Board state that, as at present advised, they are not prepared to sanction the loan. But they are willing to sanction a preliminary loan of £200 for the purpose of sinking and boring to the same depth as that proposed for the new well, with a view of ascertaining whether an ample supply of suitable water can be obtained. When this boring has been sunk, arrangements must be made for pumping the water continuously for a period of at least two months; the quantity of water so pumped to be gauged by means of a meter.

Heckmondwike Water and Lead-Poisoning.—The annual report of Dr. H. T. Broughton, the Medical Officer of Health for Heckmondwike, which was recently submitted to the District Council, and ordered to be printed, concludes with an important reference to the water supply of the township. This was stated to have been ample during the past year; but, unfortunately, the water acted on the lead service pipes. "I have spoken," says Dr. Broughton, "on the subject before; but it is of such importance that I refer to it again. Water so impregnated causes in time, in those who regularly drink it, an impaired state of health which is not always easy to account for. I would still advise you to insist on other than lead pipes being placed in new houses. The wrought-iron pipe lined with tin has proved itself an ideal pipe; and water has no corrosive action on it, and can be delivered to the consumer as pure and uncontaminated as at its source."

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 940.)

Issue.	Share	When ex-Dividend.	Dividend or Int. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Invest ment.
£			p.c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	21–22	..	4 15 5
100,000	10	,,	7½	Do. 7 p. c.	10	14–15	..	5 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105–107	..	4 13 4
200,000	5	14 Nov.	6½	Bombay, Limited	5	6¾–7	..	4 12 10
40,000	5	,,	6½	Do. New	4	4¾–5¼	..	4 19 2
380,000	Stck.	28 Feb.	11½	Brentford Consolidated	100	243–248	..	4 12 8
180,000	,,	,,	8½	Do. New	100	195–200	..	4 5 0
220,000	Stck.	14 Mar.	11	Brighton & Hove Original	100	220–225	..	4 17 9
888,500	Stck.	28 Feb.	5	Bristol	100	120–123	..	4 1 4
320,000	20	28 Mar.	11½	British	20	50–51	..	4 8 2
50,000	10	14 Mar.	11½	Bromley, Ordinary 10 p. c.	10	21–22	..	5 4 7
51,510	10	,,	8½	Do. 7 p. c.	10	16–17	..	5 0 0
328,750	10	14 Nov.	2	Buenos Ayres (New) Limited	10	6¼–6¾	..	2 19 3
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	100–103	..	5 16 7
150,000	20	28 Feb.	8½	Cagliari, Limited	20	26½–27½	..	6 0 0
550,000	Stck.	10 Apl.	13½	Commercial, Old Stock	100	283–288	..	4 13 9
165,000	,,	,,	10½	Do. New do.	100	212–217	..	4 16 9
160,762	,,	13 Dec.	4½	Do. 4½ p. c. Deb. do.	100	130–135	..	3 6 8
800,000	Stck.	13 Dec.	13	Continental Union, Limited.	100	250–255	+3	5 1 11
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	205–210	..	4 15 3
535,000	Stck.	28 Feb.	5½	Crystal Palace Ord 5 p. c. Stk	100	120–125	..	4 4 0
486,090	10	31 Jan.	11	European, Limited	10	24–25	..	4 8 0
354,060	10	,,	11	Do. Partly pa d	7½	17–18	..	4 11 9
5,646,590	Stck.	14 Feb.	12	Gaslight & Coke, A, Ordinary	100	267–272	+2	4 8 3
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	105–110	..	3 12 9
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	275–280	..	3 11 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	197–202	..	3 14 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	185–190	..	3 13 8
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	275–280	..	3 11 5
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	163–168	..	3 11 5
1,061,150	,,	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	129–132	..	3 0 7
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	140–145	..	3 2 1
908,000	,,	,,	6	Do. 6 p. c. do.	100	188–192	..	3 2 6
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	240–245	..	4 18 0
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd.	5	5¾–6¼	..	4 16 0
562,000	100	1 Apl.	5	Met. of Melbourne, 5 p.c. Deb.	100	110–112	+1	4 9 3
541,920	20	14 Nov.	5	Monte Video, Limited	20	15½–16½	..	6 1 2
150,000	5	29 Nov.	8	Oriental, Limited	5	7–7½	..	5 6 8
60,000	5	28 Mar.	7	Ottoman, Limited	5	4¾–5¼	..	6 13 4
166,870	10	14 Feb.	2	Para, Limited	10	1½–2½	..	8 0 0
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	102–106*	..	5 13 2
500,000	100	1 Dec.	6	2nd Do.	100	102–107	..	5 12 1
150,000	10	26 Apl.	7	San Paulo, Limited	10	8¾–9¼*	..	7 7 4
500,000	Stck.	14 Feb.	15½	South Metropolitan, A Stock	100	350–360	..	4 6 1
1,350,000	,,	,,	12	Do. B do.	100	293–298	..	4 0 6
290,000	,,	,,	13	Do. C do.	100	305–310	..	4 3 10
775,000	,,	16 Jan.	5	Do. 5 p. c. Deb. Stk.	100	167–172	..	2 18 2
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	230–235	..	4 17 10
				WATER COMPANIES.				
746,021	Stck.	28 Dec.	10½	Chelsea, Ordinary	100	278–283	..	3 11 6
1,719,514	Stck.	10 Apl.	8	East London, Ordinary	100	212–217	–1	3 13 9
654,740	,,	28 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	151–156	..	2 17 8
700,000	50	13 Dec.	8½	Grand Junction	50	108–112	–1	3 16 0
708,000	Stck.	14 Feb.	12	Kent	100	303–308	..	3 17 11
1,043,800	100	28 Dec.	9½	Lambeth, 10 p. c. max.	100	236–241	–9	3 18 10
406,200	100	,,	7½	Do. 7½ p. c. max.	100	200–205	..	3 13 2
330,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	136–140	..	2 17 2
500,000	100	14 Feb.	12½	New River, New Shares	100	360–370	–10	3 8 11
1,000,000	Stck.	31 Jan.	4	Do. 4 p. c. Deb. Stk.	100	140–143	..	2 15 11
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall, 10 p.c. max.	100	145–150	–2	4 0 0
126,500	100	,,	6	Do. D 7½ p.c. do.	100	138–143	–2	4 3 11
1,155,066	Stck.	13 Dec.	10	West Middlesex	100	267–272	–1	3 13 7

*Ex div.

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

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HYDRAULIC AND GAS ENGINEERS,

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

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They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

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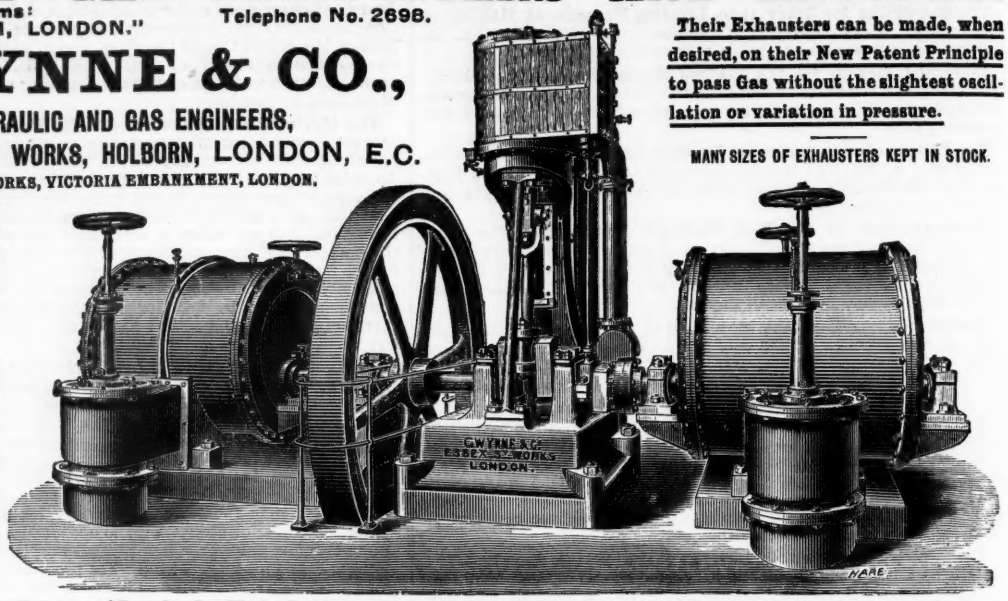

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Catalogues and Testimonials sent on application.

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

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TUBES and Fittings for Gas, Steam, and Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
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Telegrams: "HUTCHINSON BROS., BARNSLEY."

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Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also Improved Patent Rotary Scrubber-Washers.
*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

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FINEST Quality of Natural Bog Ore.
Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

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HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
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THE Undersigned is in a position to supply, at the very lowest Prices, the most suitable kind of BENZOL for enriching Gas, made from Hardman's Patent Carbonization Process, of which I am the Sole Patentee. On application, I would furnish Price on the most reasonable terms; giving advice how to utilize it on the most economical method.
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G. J. EVESON wants a Representative, for Export and Inland Trade, who can sell Coal, Cannel, and Tubes anywhere in the United Kingdom or abroad where representative is not already appointed, either on Commission or Salary, or both, with adequate allowance for expenses.
Apply, by letter, to G. J. EVESON, Corporation Street, BIRMINGHAM.

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WANTED, a competent Man as above.
Applicants must state Age and previous Experience, with Reference as to character and last employment. Wages 32s. 6d. per week.
Apply to the MANAGER, Bute Gas-Works, CARDIFF.

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WANTED, by the above Company, a thoroughly qualified Man as METER INSPECTOR and REPAIRER. Wages 34s. per week.

Applications, accompanied by three Testimonials of recent date, to be sent to the undersigned on or before Wednesday, the 15th inst.

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WANTED, a good second-hand Station GOVERNOR, 6 inch or 8 inch, with Valves and Bye-Pass Connections, all complete.

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TO BE SOLD, at once—A small Gas-HOLDER, 75 feet diameter.

Further Particulars on application to BENJAMIN HAYNES, Gas-Works, Stretford, near Manchester.

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FOR SALE—Four 8 feet square Purifiers, with Sieves, Bearing-Bars, and Covers. Being removed to make room for larger ones.

Apply to the MANAGER, Gas-Works, Banbury, OXON.

GASHOLDER, 80 feet diameter by 24 feet deep, in good condition, FOR SALE; being replaced by larger one.

Full Particulars on application to No. 2519, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—One 5000 Cubic Feet per hour ROTARY EXHAUSTER and ENGINE combined; also a 5000 Cubic Feet EXHAUSTER, without Engine. Both perfectly new.

Apply QUEEN STREET IRON-WORKS, Ravensthorpe, YORKS.

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FOR SALE—Second-hand Condensers, Two EXHAUSTERS, Crossley 8-horse power GAS-ENGINE, Two PUMPS, STATION METER, and STATION GOVERNOR.

Particulars on application to P. G. WINSTANLEY, Manager.

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Three Volumes "King's Treatise," Leather Bindings, in excellent condition.
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"Graphic Statics," by Clarke.
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"Journal of Gas Lighting" from 1887 to 1894, complete, in good condition.

OFFERS wanted.

Address Mrs. GRIFFITHS, 29, Rivers Street, BATH.

ST. ANNE'S-ON-THE-SEA GASLIGHT AND COKE COMPANY, LIMITED.

FOR SALE—One Cylindrical Station METER with 6-inch Connections and Bye-Pass; 4000 cubic feet per hour capacity (G. Orme & Co.). Also one 9-inch STATION GOVERNOR, with Valves (Braddock). All in working order.

Offers for same to be addressed to
WILLIAM H. NUTTER,
Secretary and Manager.

Gas Offices, St. Anne's-on-the-Sea.

ST. ANNE'S-ON-THE-SEA GASLIGHT AND COKE COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 2000 tons of best screened GAS COAL, to be delivered in quantities as required from July 1, 1895, to June 30, 1896.

Sealed tenders, accompanied by Name and Analysis of Coal, and endorsed "Tender for Coal," to be sent to the undersigned not later than the 30th of May inst.

The lowest or any tender not necessarily accepted.

WILLIAM H. NUTTER,
Secretary and Manager.

Gas Offices, St. Anne's-on-the-Sea.

ST. ANNE'S-ON-THE-SEA GASLIGHT AND COKE COMPANY, LIMITED.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the above Company are prepared to receive OFFERS for the surplus TAR and LIQUOR produced at their Works for One Year commencing June 1, 1895.

Coal carbonized, about 2000 Tons.

Sealed tenders, endorsed "Tar and Liquor," to be sent to me not later than May 30 inst.

The highest or any tender not necessarily accepted.

WILLIAM H. NUTTER,
Secretary and Manager.

Gas Offices, St. Anne's-on-the-Sea.

CITY OF RIPON.

THE Corporation invite Tenders for the supply of WET, DRY, and "PENNY-IN-THE-SLOT" GAS-METERS.

For further Particulars, apply to Mr. F. Shepherd, Gas Manager.

Tenders to be sent in to me by the 20th inst.

By order,
M. KIRKLEY,
Town Clerk.

May 3, 1895.

THE Directors of the Petworth Gas Company invite TENDERS for the supply of 700 Tons of good GAS COAL, to be delivered free at Petworth Station (L.B. & S.C. Railway), when required between July, 1895, and July, 1896.

Sealed tenders, endorsed "Coal," to be sent to the Secretary, on or before May 18, 1895.

The Directors do not bind themselves to accept the lowest or any tender.

No tender forms supplied.

C. H. DOWNS,
Secretary.

Petworth, May 1, 1895.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee are pre-pared to receive TENDERS for the supply of about 100,000 Tons of CANNEL and COAL required by them during the Year ending the 30th of June, 1896.

Specifications and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom tenders are to be sent on or before Tuesday, the 14th of May, 1895.

A. NICHOLSON,
Town Clerk.

April 23, 1895.

TAUNTON GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the supply of COAL over One Year from the 1st of July next.

Particulars can be had from the Manager, to whom sealed tenders may be delivered not later than the 1st of June next.

A. EDWARDS,
Secretary and Manager.

May 4, 5.

TENDERS FOR TAR.

THE Directors are prepared to receive TENDERS for the surplus TAR, over a period commencing the 1st of July next.

Tenders to be sent to the Manager, by the 1st of June next.

A. EDWARDS,
Secretary and Manager.

May 4, 1895.

THE Directors of the Tynemouth Gas Company are prepared to receive TENDERS for 24,000 Tons of GAS COALS (about a Twelvemonth's supply), to be delivered by rail at the Company's Siding, North Shields, in such quantities as may be required weekly; the contract to commence from the termination of the contract now running, which will expire during July next.

Offers, endorsed "Tender for Gas Coal," specifying Name and Description of Coal, and Pit and Seam from which it will be supplied, to be sent to the Chairman of the Company, on or before Tuesday, the 14th inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
W. B. DAVIDSON,
Secretary.

North Shields, May 3, 1895.

CORPORATION OF BANGOR.

SUPPLY OF GAS COAL.

THE Gas Committee of the above Cor-poration invite TENDERS for the supply of 4000 Tons of GAS COAL, to be delivered at the Bangor Station (L. & N.W. Railway), or by Ship on the Beach. The Beach is well sheltered, and has a good level surface.

The Coal must be of good quality, and capable of yielding not less than 10,000 cubic feet of 17-candle Gas per ton, well screened, and free from Bats, Pyrites, or other Impurities.

Form of Tender and any Information may be had on application to the undersigned.

Tenders, with copy of Analysis, to be sent to the Chairman of the Gas Committee, on or before the 23rd inst.

The Committee do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to divide the contract between two or more Firms.

JOHN SMITH,
Manager.

Bangor, May 2, 1895.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 60,000 Tons of best well-screened large GAS COAL, to be delivered between July, 1895, and the 30th of June, 1896, in monthly quantities, in accordance with the Specification.

Parties tendering may do so for the whole quantity or for quantities from 5000 tons upwards.

Forms of Tender and Specification of monthly deliveries may be obtained on application to Mr. H. Morley, the Company's Engineer.

Sealed tenders to be sent to the undersigned not later than Twelve noon on Friday, the 10th day of May next, addressed to the Chairman of the Company, and endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order,
GEORGE CLARKE,
Secretary.

Gas Offices, Cardiff,
April 27, 1895.

TENDERS FOR COAL.

THE Directors of the Harlow and Saw-bridgeworth Gaslight and Coke Company invite TENDERS for 900 or 1000 tons of good GAS COAL, delivered at Harlow (free) in quantities of not less than 50 Tons.

Tenders, addressed to the Secretary, Gas Company, Harlow, to be sent in on or before May 18, 1895, and to be sealed and endorsed "Tender for Coals."

ROCHDALE CORPORATION.

TO MAKERS OF GAS APPARATUS.

THE Gas Committee of the above Cor-poration invite TENDERS for the supply of 50 Cast-Iron RETORT MOUTHPIECES, with Self-Sealing Lids 20 in. by 15 in. ⏢ to 18 in. circular in shape, to be delivered by the 30th of June next.

Any Information in reference thereto may be obtained on application to Mr. T. Banbury Ball, the Manager at the Gas-Works.

Tenders, endorsed "Mouthpieces," must be sent in to me not later than Noon on Wednesday, May 15, 1895.

By order,
JAMES LEACH,
Deputy Town Clerk.

Town Hall, Rochdale,
May 3, 1895.

CITY OF BELFAST.

IRON ROOFS WANTED.

THE Gas Committee of the Belfast Cor-poration invite TENDERS for the CONSTRUCTION of Two ROOF SPANS of Corrugated Iron, supported on Steel Columns and Principals, and for the TAKING DOWN of an EXISTING IRON ROOF, and removal of same, at price to be mentioned in the contract.

The Drawings and Specification may be seen at the Engineer's Offices, Gas-Works, Belfast.

Copy of Specification, with Form of Tender attached, can be had on payment of One Guinea, to be returned on receipt of a *bond-fide* tender. Parties unable to inspect Plans at the Works can obtain a copy of the Drawings on payment of One Guinea.

Tenders, endorsed "Tender for Roofs," to be lodged in the Town Clerk's Office, Belfast, not later than the 22nd inst.

The lowest or any tender not necessarily accepted.

JAMES STELFOX,
Engineer and Manager.

May 2, 1895.

LIVERPOOL UNITED GASLIGHT COMPANY.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 80,000 Tons of CANNEL and 170,000 Tons of COAL, to be delivered at the various Works of the Company, during the period of Twelve Months between the 1st of July, 1895, and the 30th of June, 1896.

Tenders will be received for the whole or any portion of the above quantity.

The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

Full Particulars and printed Forms of Tender can be obtained on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom tenders, on the printed form, must be delivered, on or before Saturday, the 11th of May, endorsed "Tender for Cannel and Coal."

By order,
WILLIAM KING,
Engineer.

Gas Office, Duke Street,
Liverpool, April 23, 1895.

CORPORATION OF NOTTINGHAM.

(GAS DEPARTMENT.)

TENDERS FOR COALS.

THE Gas Committee are desirous to receive OFFERS for supplies of COALS, COBBLES, or NUTS for the period terminating the 30th of June, 1896.

The Large Coals and the Cobbles or Nuts are to be separately delivered, where and as from time to time directed, by and at the expense of the Contractors, upon the Gas-Works Siding, Great Northern Railway, in the Eastcroft at Nottingham, and also on the Gas-Works Sidings, Midland Railway, at Radford and Basford respectively; and at and after the rate of one-eighth part of such total quantity in each calendar month, commencing with the month of July next, till the Corporation shall be satisfied with the amount of accumulated Stock, and afterwards at such rate as shall be from time to time directed, till the agreed quantity shall have been delivered.

The Coals, Cobbles, or Nuts are to be the best of their respective kinds, freshly wrought and well screened (description, sizes, and inclination of screen to be specified), to be as free as possible from Sulphur, Bats, Bind, Refuse, and Dirt, and shall be weighed (20 cwt. to the ton) upon the Corporation Machines, or upon such other Machines as may be mutually agreed upon.

Payments will be made monthly, if and so long as the contract shall be duly fulfilled.

The Corporation do not bind themselves to accept the lowest or any tender.

Further Information and Forms on which the tenders must be made may be obtained on application to me, at the General Manager's Office; and the tenders (sealed), specifying the description of Coals, the Seam, and the Pits at which they are to be raised, and stating the prices for deliveries at the several places, and in manner and subject to the conditions aforesaid, must be delivered to Sir Samuel George Johnson, Kt., Town Clerk, on or before Saturday, the 18th day of May, 1895.

By order,
WILLIAM REGINALD CHESTER,
Engineer and General Manager.

Corporation Gas Offices, George Street,
Nottingham, April 25, 1895.

LEEDS CORPORATION GAS DEPARTMENT.

TENDERS required as below:—

For CRAVEN or DERBYSHIRE LIME.
For WROUGHT-IRON TUBES.
For 2½-inch, 3-inch, and 4-inch SELF-FACED BRADFORD or HALIFAX FLAGS.
For PRESSED and COMMON RED BRICKS.

Forms of Tender may be had on application to Mr. R. H. Townsley, at the offices of the Gas Department, Municipal Buildings, Leeds.

Endorsed tenders, addressed to the Chairman of the Gas Committee, at the Offices as above, will be received not later than Wednesday, the 15th inst.; and no tender will be considered, except on the form provided.

The lowest or any tender will not necessarily be accepted.

BUXTON LOCAL BOARD.

CONTRACT FOR TAR AND LIQUOR.

THE Buxton Local Board invite Ten. DERS for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Works in Ashwood Dale, during one or more years.

Particulars to be obtained of Mr. Geo. Smedley, Gas Department, Town Hall, Buxton.

The Board do not guarantee to accept the highest or any tender.

Tenders, endorsed "Tender for Tar, &c.," to be addressed to the Chairman of the Gas Committee, and sent in not later than the 1st of June prox.

By order,
JOSIAH TAYLOR,
Clerk to the Board.

Buxton, May 4, 1895.

TO PIPEFOUNDERS.

THE Directors of the Bishop's Stortford Gas Company, Limited, are prepared to receive TENDERS for the supply and delivery (carriage paid to the Bishop's Stortford Station) of—

29 Tons of 9-inch SOCKET and SPIGOT GAS-MAIN.
3 Tons of 6-inch SOCKET and SPIGOT GAS-MAIN.
1 Ton of SPECIALS.

Particulars may be obtained upon application to the Engineer and Manager, Mr. J. W. Portass.

Tenders, endorsed "Tender for Pipes," to be sent to the undersigned on or before the 13th inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
WILLIAM GEE,
Secretary.

SCARBOROUGH GAS COMPANY.

TENDERS FOR COAL.

THE Directors of the Scarborough Gas Company are prepared to receive, on or before Noon on Saturday, the 11th day of May next, OFFERS for about 22,000 Tons of high-class COAL, suitable for Gas Making, for delivery in N.E. Railway Company's Waggons, at the Gas-Works Siding, Scarborough, in such monthly quantities as may be required for a period of One, Two, or Three Years, commencing the 1st of July next.

Particulars and printed Forms of Tender may be obtained on application (in writing only) from the undersigned, to whom tenders, duly endorsed "Tender for Coal," must also be addressed.

By order of the Board,
J. HOLLIDAY,
Engineer and Secretary.

Gas Offices: 32, Westborough, Scarborough,
April 19, 1895.

BOROUGH OF BURTON-UPON-TRENT.

TO COLLIERY PROPRIETORS.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, are prepared to receive TENDERS from Colliery Proprietors for the supply of 25,000 Tons, or a portion thereof, of best screened GAS COAL.

Forms of Tender and Conditions of Supply may be obtained upon application at my Office; and sealed Tenders, endorsed "Coal," are to be delivered to me at or before Ten a.m. on the 25th day of May inst.

The Council do not bind themselves to accept the lowest or any tender.

F. L. RAMSDEN,
Manager and Engineer.

Gas and Electric Light Works,
Wetmore Road, Burton-upon-Trent,
May 1, 1895.

BOROUGH OF MANSFIELD.

TENDERS FOR COAL AND CANNEL.
TENDERS FOR TAR AND AMMONIACAL LIQUOR.

COALS.—The Gas Committee are pre- pared to receive TENDERS for 1200 Tons of CANNEL and 5600 Tons of best screened GAS COAL, delivered at Mansfield Station for One Year from June 1, 1895, to May 31, 1896.

TAR AND LIQUOR.—TENDERS for TAR AND LIQUOR made during the Year from July 1, 1895, to June 30, 1896. Tenders for Liquor to be made either at a fixed Price per ton or on Sliding Scale regulated by the price of Sulphate.

Tenders, endorsed, to be sent in to the undersigned on or before May 31, 1895.

Particulars and other Information may be obtained from Mr. A. Graham, Engineer and Manager, Gas-Works.

By order of the Committee,
J. HARROP WHITE,
Deputy Town Clerk.

May 2, 1895.

WYE GAS COMPANY, KENT.

TENDERS and Specifications are invited for the erection of a new GASHOLDER and TANK complete of 15,000 cubic feet capacity. Also SCRUBBER and CONDENSERS, suitable for a make of 2½ millions.

Tenders to be sent in on or before Saturday, the 11th of May to the Secretary.

The Directors do not bind themselves to accept the lowest or any tender.

W. LEWIN,
Secretary.

TENDERS FOR GAS COAL.

THE Corporation of Droitwich invite TENDERS for the supply of from 1100 to 1800 Tons of best screened GAS COAL, to be delivered free at Droitwich (G.W.) Railway Station, at such times and in such quantities as may be required, prior to the 31st of May, 1896.

Particulars and Form of Tender may be obtained on application to the Manager of the Gas-Works.

Sealed tenders, on the form provided for the purpose (with the Analysis of the Coal to be supplied), endorsed "Tender for Gas Coal," to be sent to the undersigned on or before the 24th of May inst.

The Corporation do not bind themselves to accept the lowest or any tender.

S. JOHN TOMBS,
Town Clerk.

Droitwich, May 1, 1895.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is Hereby Given, that the Half- YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held, at the City Terminus Hotel, Cannon Street, London, on Thursday, the 2nd inst.

Sir JULIAN GOLDSMID, Bart., M.P., in the Chair,

When the following RESOLUTIONS were unanimously passed:—

"That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes."

"That a Dividend of £5 per cent. for the Half Year ended the 31st of December last, and a Bonus of £1 per cent., be declared upon the £3,800,000 Capital Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 1st of June next."

"That Arthur Lucas, Esq., C.E., be re-elected a Director of the Association."

"That Clarence Pigou, Esq., be re-elected a Director of the Association."

"That The Hon. E. C. Leigh, Q.C., be re-elected a Director of the Association."

"That Joseph Sebag Montefiore be re-elected an Auditor of the Association."

"That the cordial thanks of the Meeting be given to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the Chair this day, to the Secretary and the London Staff, and to Mr. H. V. Lindon, the Agents, Engineers, and other Officers of the Association on the Continent."

By order of the Board,
G. F. THOMPSON,
Secretary.

No 21, Austin Friars, London, E.C.,
May 3, 1895.

NOTICE.

TO GAS ENGINEERS AND OTHERS.

MESSRS. CLAPHAM BROS., Limited, Keighley, Yorkshire, are no longer authorized to Manufacture my CONDENSER and WASHER-SCRUBBERS.

The above-named Gas Apparatus are erected and giving entire satisfaction at the following places: Neath, Lincoln, Sheffield, Ellesmere, Mountain Ash, Malden, Cullingworth, Montreal (Canada), Woodstock (South Africa), Cape Town (South Africa), &c.

These Appliances can now be obtained solely of the undersigned.

Winchester House, London, E.C. J. A. KELMAN.

NOTICES FOR POSTING IN GAS-WORKS.

CARDS suitable for Exhibiting in Gas- Works, directing Officers and Workmen to REPORT all ACCIDENTS witnessed by them, together with the Clause of the "NOTICE OF ACCIDENTS ACT, 1894," specifying the notice required to be sent to the Board of Trade, can be obtained, *price 4d. each, or 2s. 6d. per dozen, post free.*

Section 4 of the "CONSPIRACY AND PROTECTION OF PROPERTY ACT, 1875," has been similarly printed. It is required, under a Penalty of FIVE POUNDS, that a Copy of the Section shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by persons employed thereat. Copies, in large type, on broad sheets (22½ inches by 17½ inches) may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C. *Price 2s. per dozen; 10s. 6d. per 100.* On Cards the same size as those relating to the "Notice of Accidents Act," *price 4d. each or 2s. 6d. per dozen.*

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS,

By

NORTON H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
B Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF
NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

11, BAY STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."
Established 1872.

COKE BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton. . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton. . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar . . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

PIPES, 2-in. to 8-in. PIPES, 2-in. to 8-in. PIPES.

MONIER-WILLIAMS & Co.

IRONFOUNDERS

MIDDLESBROUGH.

KENT'S THICK GAS COAL

RAISED AT

The Wharncliffe Woodmoor Colliery,

BARNSLEY.

Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham :—

Specific Gravity (Water 1).	1·276
Weight of One Cubic Foot.	79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal	2·68 per cent.
Volatile Matter.	35·60 ,,
Fixed Carbon	58·80 ,,
Sulphur	0·96 ,,
Ash.	1·96 ,,

COMMERCIAL ANALYSIS.

Gas per Ton of Coal	11,760 cub. feet.
Gas per Cubic Foot of Coal	418 ,,
Illuminating Power	17·44 candles.
Value of One Cubic Foot in Sperm	418 grains.
Value per Ton of Coal in Sperm	703 lbs.
Coke per Ton of Coal	1367 ,,
Coke	61·05 per cent.
Ash in Coke	3·21 ,,
Sulphur Eliminated with Volatile Products per Ton of Coal	9·4 lbs.
Sulphur in Coke per Ton of Coal	12 ,,
Ammoniacal Liquor per Ton of Coal	19·7 galls.
Tar per Ton of Coal	12·2 ,,

R. O. PATERSON, C.E.

Gas-Works, Cheltenham, 8th August, 1894.

For Price, &c., apply to the

Wharncliffe Woodmoor Colliery Co

LIMITED,

BARNSLEY;

Or to **Mr. W. H. HARVEY,**

17, Old Queen Street, Westminster, S.W.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.
Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

Messrs. The

WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13¼ cwt.
Illuminating Power of Gas, average of a series of tests, **17 Sperm Candles.**
The Coke was of excellent quality.
The following is a complete ultimate Analysis of the Coal.

	Per Cent.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

TO EMPLOYERS, COMPANY DIRECTORS, ETC.

The LAW GUARANTEE & TRUST SOCIETY, LIMITED,

GUARANTEES FIDELITY.

Send for complete Prospectus, containing Balance-Sheet, Copy of Policy, &c., &c.

HEAD OFFICE:
49, CHANCERY LANE, LONDON, W.C.

LOW MOOR BLACK BED
GAS COAL.

YIELD OF GAS PER TON . 10,375 CUBIC FEET.
ILLUMINATING POWER . 17·50 SPERM CANDLES.
COKE . . . . . 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to
GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

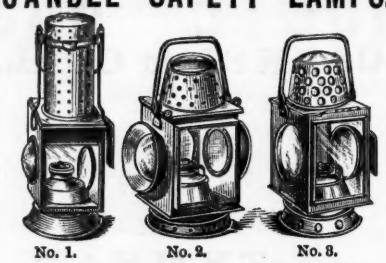
LABORLESS WORK
In 1895.

ENGINEERS AND MANAGERS
Making preparations to adopt
SELF-ACTING SYSTEMS OF CARBONIZING
In 1895,
are cordially invited to call and inspect our latest Designs of Automatic Coal and Coke Handling and Charging Machinery.

We send skilled Draughtsmen to get Particulars for Detail Plans.

Address:—
NEW CONVEYOR CO., LTD.,
3 & 4, LIME STREET SQUARE, LONDON, E.C.

ARMSTRONG'S PATENT
CANDLE SAFETY LAMPS.



No. 1. No. 2. No. 3.
48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

T. B. KITTEL, SHEFFIELD.
CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL
ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

TAR AND LIQUOR PURCHASED.

JOHN CLARKSON MAJOR,
(Established 1851,)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.

SULPHATE OF AMMONIA
SATURATORS.

JOSEPH TAYLOR & CO.,
Central Plumbing Works, Town Hall Square,
BOLTON.
Practical Makers of all kinds of Saturators, and Specialists in every description of Lead Work required in connection with Sulphate Plants.
Special attention to Repairs.
Improved Lead-Burning Machines,
Sulphate Bagging Machines, Copper Scoops, &c.
HIGHEST REFERENCES ON APPLICATION.

BOLDON GAS COALS.
Worked by THE HARTON COAL CO., LTD.
Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to
The Gaslight and Coke Company, South Metropolitan Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, San Paulo Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

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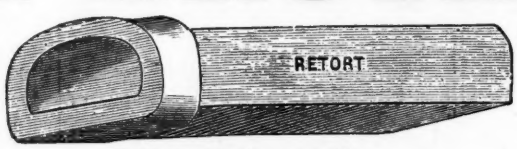

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Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
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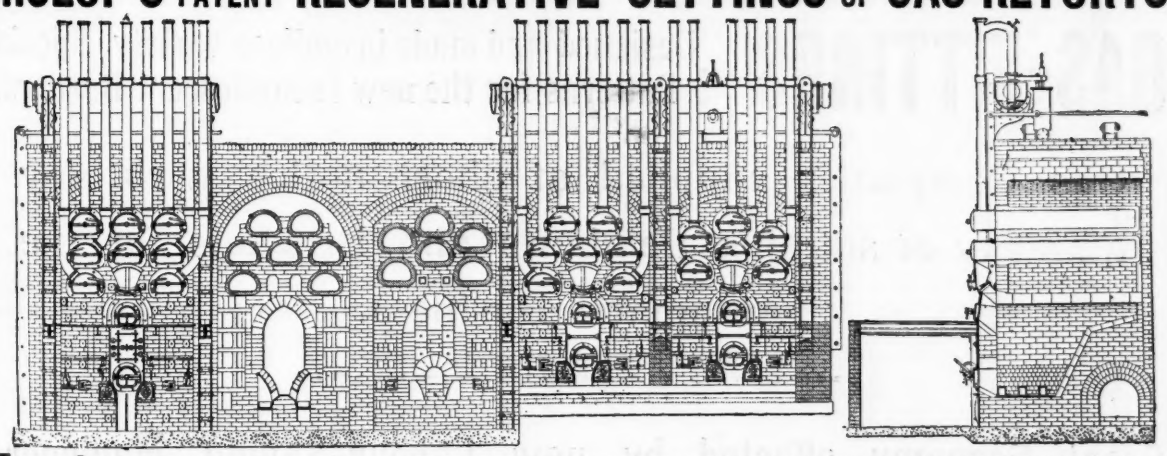
HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS, CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13 000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

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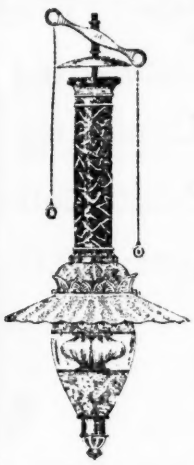

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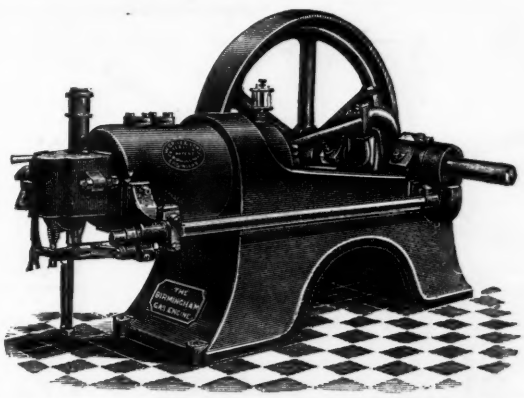

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See also Advt. p. 936.

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